NOVEMBER 1953

FOUNDRY

...WHEREVER METALS ARE CAST

LARGE WOOD PATTERNMAKING
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THE PIONEER . . . AND STILL THE LEADER

Purite, the scientific flux for better melting and cleaner iron, is sold by leading foundry supply houses in the United States and Canada.

1 Purite produces a higher percentage of finished castings per ton of metal poured.

2 Purite gives 100% fluxing action in the cupola—100% desulphurizing action in the ladle.

3 Purite gets to all the iron quicker.

4 Purite is time-tested and proved for unsurpassed desulphurizing uniformity.

5 Purite comes in 2-lb. pigs and 2-oz. tablets—no weighing or measuring required.

6 Purite is 100% pure fused soda ash—you do not pay for inert materials.

7 Purite does not crumble—no waste—no dust.

8 Purite can be shipped in bulk carloads at substantial savings over bag shipments—is easily stored without deterioration.

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Mathieson Industrial Chemicals Division
Baltimore 3, Maryland

MATHIESON

Have You a Fortune Tied Up in Dead Core Storage Space?

Free it with Allis-Chalmers Dielectric Sand Core Dryer

Many foundries are wasting hundreds of feet of valuable floor and shelf space by storing cores. If this is the problem in your foundry, why not eliminate it?

Make cores only as you need them with a *Foundromatic* sand core dryer. There is no necessity for storing cores when you use the *Foundromatic* dryer. Cores are dried in minutes instead of hours. When they come out of the dryer they are cool enough to handle barehanded, and are ready for the molder. You can cut the time from core maker to molder from hours (or days or months) to minutes.

OTHER ADVANTAGES

Best of all, make better cores than before. This method completely eliminates burned or overbaked cores. Fuel savings may be as much as 60% because all the heat goes into the core.

Find out what the improved *Foundromatic* dryer can do for your foundry. Call your nearby A-C district office for specifications showing new high capacity, or send coupon.

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DETROIT

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Dielectric
SAND CORE DRYER

QUESTIONS and ANSWERS
About Dielectric Sand Core Drying

1. What is typical drying time for a core using the Foundromatic *dryer?*
This core is dried in the *Foundromatic* dryer in about 3 minutes. It used to take 70 minutes in a conventional oven.

2. How big a core can be dried in the Foundromatic *dryer?*
Cores up to 400 pounds are being dried successfully in daily production. In fact, any core that will pass through an aperture 36 inches wide and 13 inches high can be dried.

3. What about collapsibility?
Resin bonded cores have very good collapsibility, contributing to a faster, cleaner shakeout.

4. How much maintenance is there?
Very little. Periodic replacement of tubes; oiling of rollers, and conveyor and blower motors.

5. How long will tubes last?
Tubes have an estimated life of 5000 hours.

6. Do I need an electronic engineer to help me with the Foundromatic *dryer?*
No. Once equipment is installed and operating, any personnel can be quickly trained to follow simple operating instructions.

SEND

Allis-Chalmers
Milwaukee 1, Wisconsin

Please send me specifications on the improved *Foundromatic* sand core dryer.

Name .....

Title .....

Company .....

Street .....

City ..... State A-4185

HERE'S ALL YOU NEED

for easier, better sand control

Yes, these three additives, mixed in your regular heap or system sand, will provide the precise sand characteristics needed for your work. FEDERAL GREEN BOND for desired sand strength. CROWN HILL SEACOAL for carbon content. FEDERAL SAND STABILIZER for flowability. And of the three, FEDERAL STABILIZER can be the one factor to really *"balance out"* your sand to obtain hoped-for results. STABILIZER definitely provides better flowability so green strength can be run higher—makes for easier ramming to insure more uniform mold hardness—allows a wider range of safe moisture content. STABILIZER induces molds to take dry or wet coatings more readily, with deeper penetration—and minimizes lumpy shakeout to permit maximum sand reclamation.

In addition to obtaining better results, you also get low-cost sand preparation with these additives—because they will actually cost you *less than $1.00 per ton of castings produced!*

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FOUNDRY

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THE COVER: Scale models of finished casting assist in the design, layout and construction of large patterns. See story on p. 104

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WATERBURY FARREL FOUNDRY... solve

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FOUNDRY PRODUCTS DIVISION • 2191 WEST 110TH STREET • CLEVELAND 2, OHIO

ve he problem of KING-SIZE cores . . .

INDUCTOL

the pre-baked core oil

Huge machinery tool castings weighing from five to twenty-five tons are an everyday occurrence at Waterbury Farrel Foundry & Machine Company, Waterbury, Connecticut.

A large part of the core work involves massive chunks and intricate shapes. Cores have to be strong before and after baking. They have to bake out fast and thorough with no green centers. Furthermore, smaller cores in the same oven cycle must be protected from overbaking.

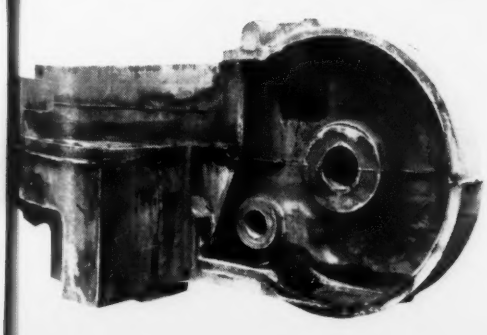
These are a few of the many reasons why Waterbury Farrel uses INDUCTOL in their core mix. In addition they gain the benefits of easy mixing and excellent workability. INDUCTOL, too, forms noticeably less gas than conventional core oils, and it is non-toxic.

Perhaps INDUCTOL can answer some of your core-making problems. Write for details and samples, or call your LINOIL man.

The 102-year-old Waterbury Farrel Foundry produces castings for use in their line of metal-working machines. Castings weigh from ¼ pound to 25 tons. One of the smallest cast parts is displayed here against the background of a 16-ton frame for a nut forming machine.

Snagging rough casting of a 5½-ton frame for a cam eyelet machine.

It takes 2½ days to complete this 6-ton grey iron casting, the frame for a Waterbury Farrel screw thread roller.



write for details on the **ADM** line of foundry products:

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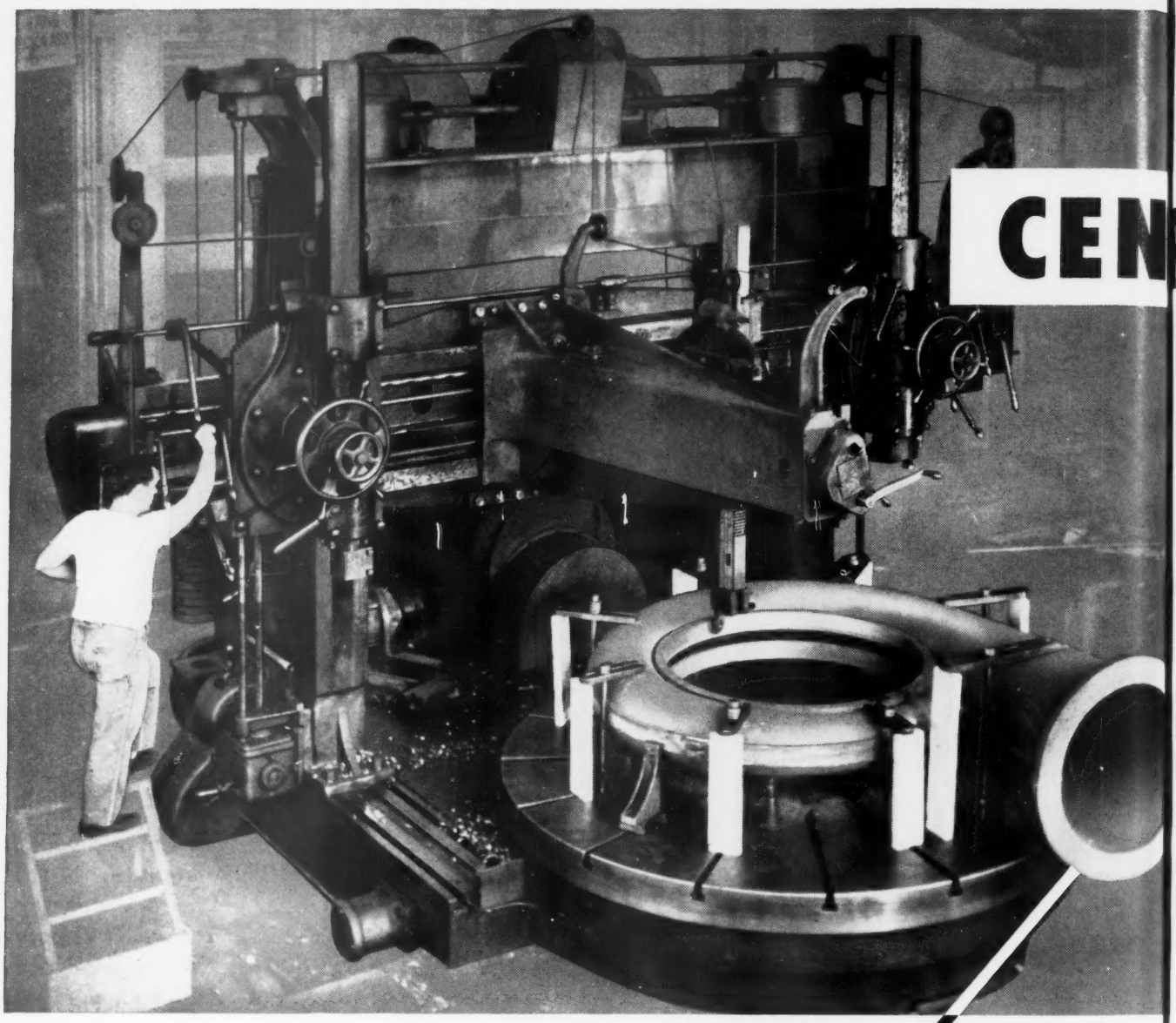
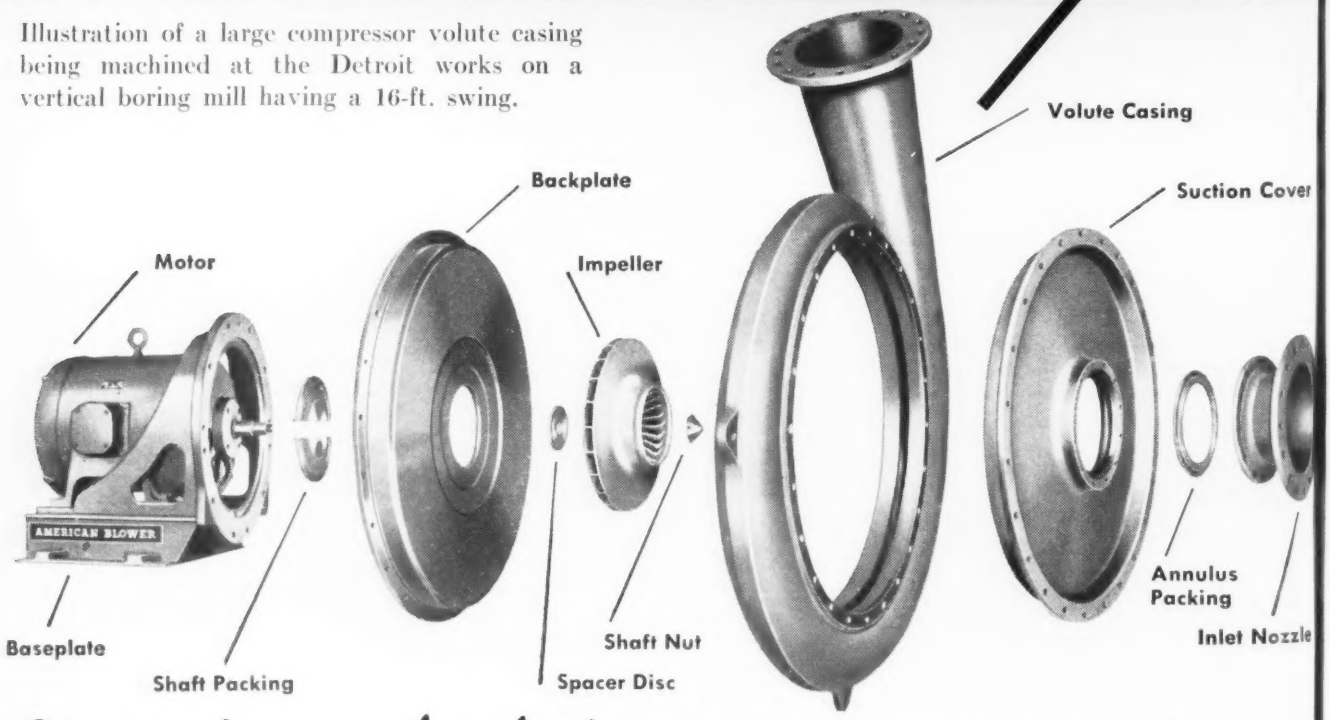


Illustration of a large compressor volute casing being machined at the Detroit works on a vertical boring mill having a 16-ft. swing.



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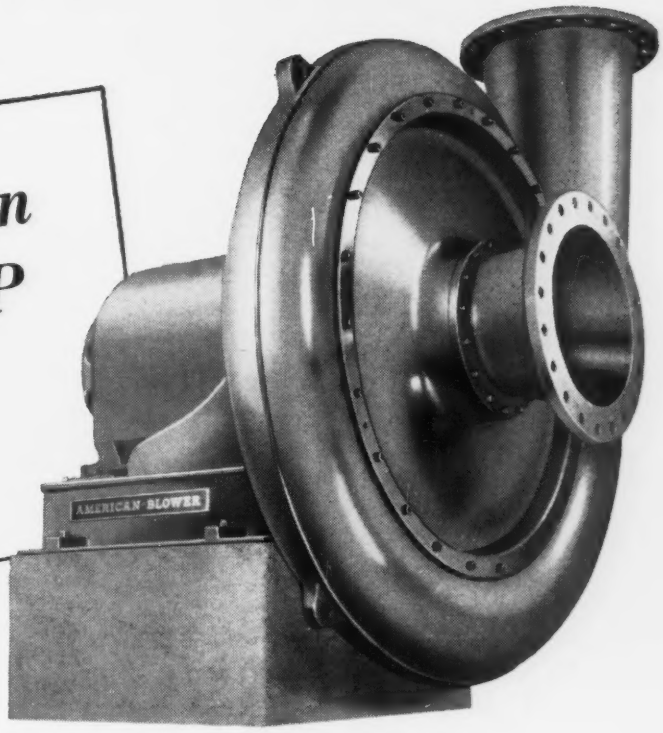

Take an excellent design, quality materials, modern machine tools, superior research and testing facilities, skilled engineers and craftsmen — and you have the important factors behind American Blower's outstanding line of centrifugal compressors. To you, this insures a quality product built and backed by a great name in air handling.

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Whether you need equipment for heating, cooling, ventilating, air conditioning, vapor absorption, fume removal, dust collecting, mechanical draft, heat transfer or smooth power transmission thru Gyrol Fluid Drives — American Blower manufactures a complete line of products to meet your requirements. Helpful technical literature is available on each product.

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How WESTINGHOUSE saves $37,000 yearly at its Trafford, Pa. Foundry

■ This plant formerly loaded and unloaded bagged material, handled barrels and stored patterns by manual methods. Today fork trucks have mechanized all these operations. Result: *an annual saving of $37,000.*

In the warehouse, for example, the fork trucks now stack materials on pallets—right up to the rafters. Indirect benefits: space saving, fewer accidents, less material damage. Direct benefits: substantial savings in labor costs.

Fork-truck handling and tiering of patterns eliminated back-breaking work, increased storage capacity 500% and made additional labor savings.

Unloading bagged material (wood flour, sea coal, mogal, pich, etc.) and fire brick (formerly manhandled one at a time) is now done in palletized unit loads—another big cost saver. And still more money is saved by handling barrels with a Baker 4-Purpose Carriage truck and drum shoes.

write for *6-page special report on the application of Baker attachments to various loads.*

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industrial trucks

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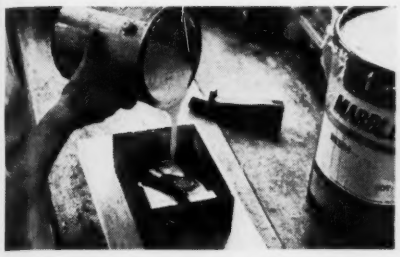
In these few, simple steps pictured below, the modern pattern maker duplicates costly master patterns, match plate parts and commercial models; gets improved molds, lowers construction and maintenance costs, reduces mold damage . . . in a word, makes this modern resin, Marblette Resin #71, one of his finest, most economical new tools.

Write today for the *Marblette Manual for Phenolic Casting Resins*—a manual for the modern pattern maker. The Marblette Corporation, Long Island City 1, N. Y.



Carefully proportioned water and Plaster of Paris mixture being poured over the pattern. Flat edges of frame prevent leaking underneath.

After plaster has set just enough to retain its form, the pattern is carefully withdrawn, avoiding warping or swelling.

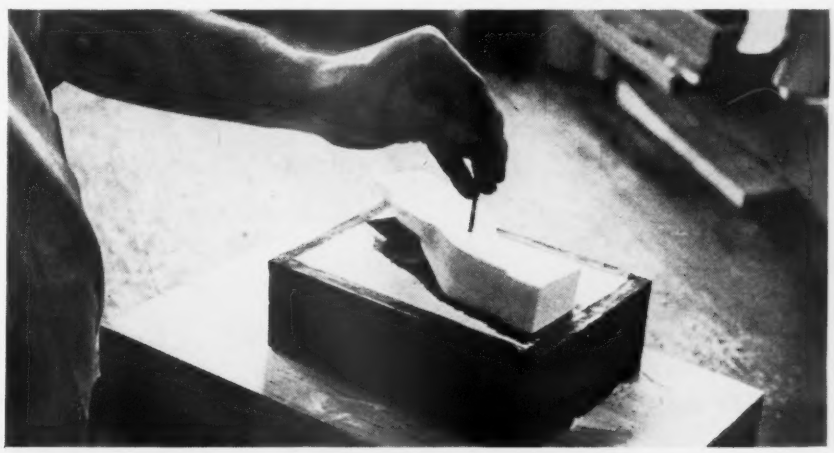
After sufficient drying time, the plaster mold is painted with a plastic paint to help seal porosities and ease extraction of cured pattern.

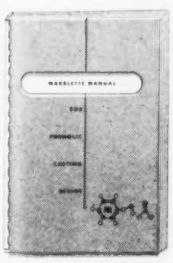
Adding the proper amount of acid hardener to the liquid resin #71 insures optimum physical properties of master pattern duplicate.

Resin-hardener mix is poured into pre-warmed mold. Prewarming lessens the time needed to cure resin in oven.

Mold filled with resin is carefully placed in oven. Small patterns will cure in about an hour at 180°F.

Final extraction of cast duplicate takes place after mold has thoroughly cooled. A wood screw eye will aid in extraction.





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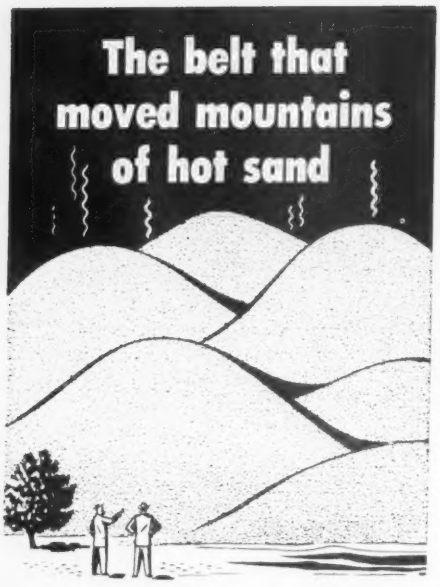

Imperial Sahara Belt ran 9000 hours at Westinghouse Air Brake

The sand moved by an Imperial Insulated Sahara Belt in the Air Brake Division brass foundry at Westinghouse Air Brake Co. is measured in mountainous proportions. Working 16 hours a day for 2 years, 5 months and 14 days, this durable belt (18 in. x 5 ply, 150 ft. long) transported 26,820,000 pounds of sand at temperatures up to 400° F. . . . an amazing service record.

Unexcelled for hot materials

Such durability in handling hot materials is built into Imperial Sahara Belting. Constructed of heavy-duty, tightly-woven hard silver duck, it is double-stitched for positive prevention of ply separation. Special impregnation and insulation give high heat and wear resistance.

Best because it's job-designed

Imperial Belts for all purposes are *job-designed* for your specific operating conditions. Imperial Belts can reduce your mountain-size materials conveying and elevating problems to money-saving molehills. Write for catalog and prices today.

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Engineered Belting—
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With the Editors

NEVER LOST A DAY: The founder and first editor of FOUNDRY really knew how to make castings. Proof of this was found recently in the form of a handwritten copy of a recommendation which the late John A. Penton received from his employer upon completing his apprenticeship as an iron molder. The recommendation, reproduced below, now is on display in FOUNDRY's offices. It reads:

Sarnia Iron Works, July, 1883

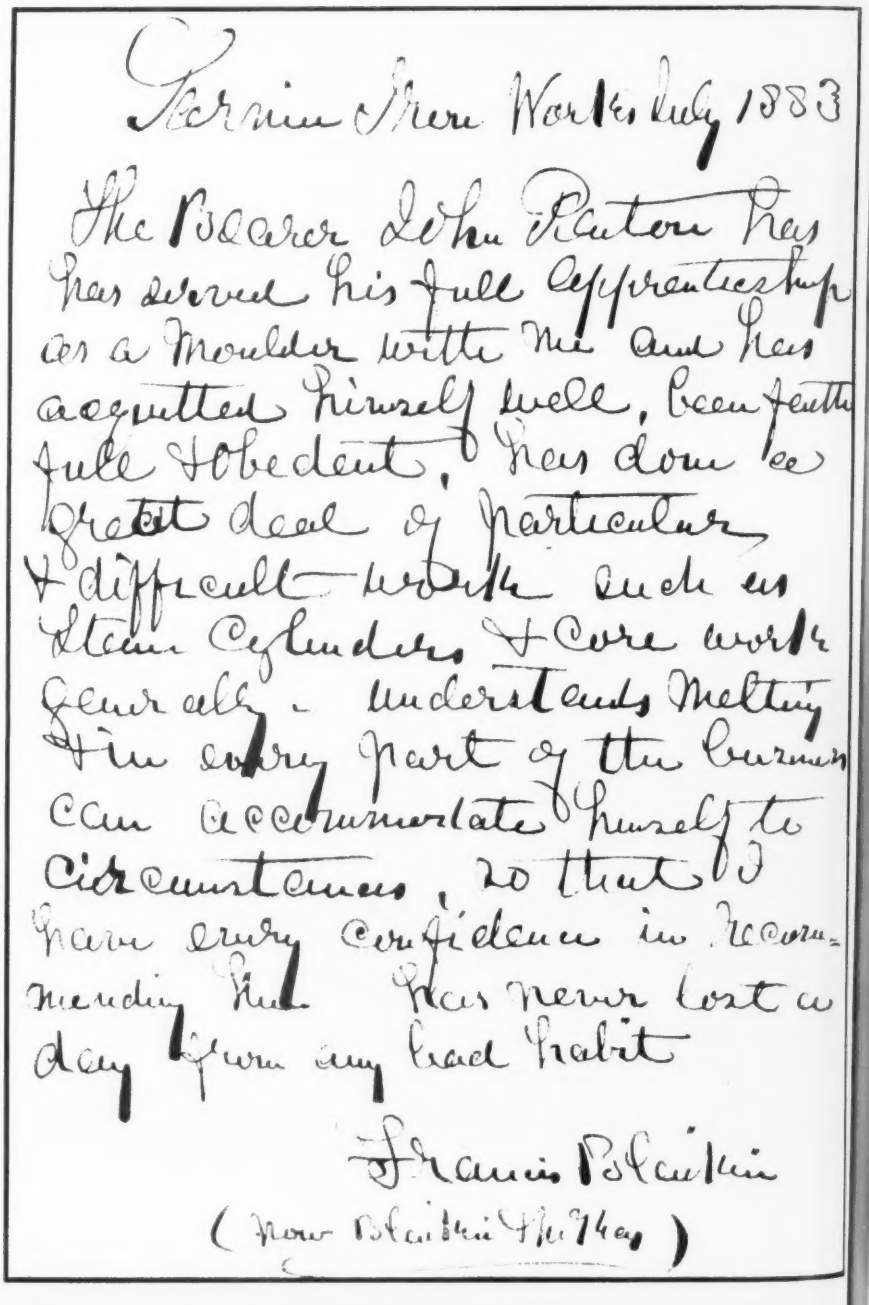
The Bearer John Penton has served his full apprenticeship as a Moulder with me and has acquitted himself well, been faithful and obedient. Has done a great deal of particular & difficult work such as steam cylinders & core work generally. Understands melting & in every part of the business can accommodate himself to circumstances, so that I have every confidence in recommending him. Has never lost a day from any bad habit.

Francis Bleukin

—o—

How To Win Friends: A recent advertisement of an organization doing nondestructive testing of components shows an x-ray of a casting and carries the heading "Picture of a Frustrated Killer!" The advertisement states in part: "This innocent-looking casting is a potential death dealing monster. It's a vital unit for

(*Concluded on page* 12)



Sarnia Iron Works July 1883

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Francis Bleukin

(Now Bleukin the Man)

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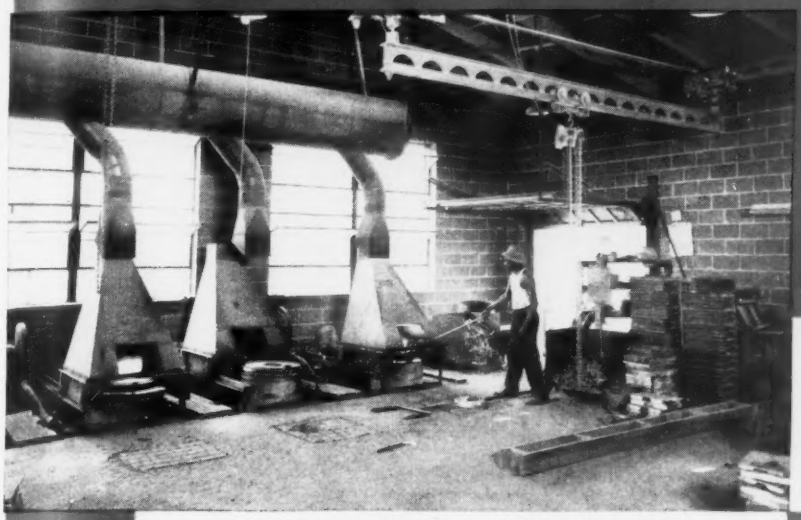
CRUCIBLE *Melting*

THE MODERN METHOD!



Three of the four oil-fired furnaces with No. 60 Crucibles, in the new quarters of O'Hare Brass & Aluminum Foundry Company of St. Louis, Mo. Crucible capacity 200 lbs. brass or 60 lbs. aluminum. Note roll-back fume hoods and excellent housekeeping.

Crucible melting belongs in the up-to-date, modernized non-ferrous foundry as shown in the illustration of an old-established company moved into new quarters.

Crucible melting completes the picture of overall efficiency and economy required to produce high quality castings in a highly competitive market.

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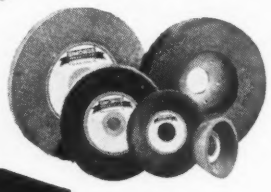
The RIGHT SELECTION pays off in Grinding Wheels too!



SIMONDS ABRASIVE CO.

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In buying wheels . . . as in hiring men . . . intelligent selection pays off in production. Simonds offers you productive grinding wheel selection in three ways: (1) through our free data book with wheel specifications for all your grinding jobs . . . plus information on Simonds complete line, including grinding wheels, mounted wheels and points, segments, polishing grain: (2) through Simonds field engineering service, ready at any time to help you get wheels for your specialized jobs: (3) through your Simonds distributor—constantly abreast of the latest developments in industrial grinding,and equipped to supply you promptly with Simonds wheels for superior results.

Write for data book and name of your Simonds distributor.

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(*Concluded from page* 10)

one of America's giant Atomic Bombers. Every single one of these particular parts is x-rayed by us to make absolutely certain that there are no structural defects hidden beneath the surface. For if, while in flight, this part should fail, it could destroy a $10,000,000 plane, its crew and mission."

The foundry industry spends large amounts of time and money to build an acceptance for castings, but thoughtlessness of alleged friends can provide considerable damage without much effort.

—o—

He Knew About Castings: During the vacation I read "I Remember," an autobiography of the late Dexter S. Kimball (McGraw-Hill Book Co.), and enjoyed it very much. This great educator, who was emeritus professor of Mechanical Engineering, Cornell University, and past president, American Society of Mechanical Engineers, was quite familiar with the foundry industry and the application of castings to engineering design. In his early days before attending Stanford University, he worked for several companies having foundries.

Perhaps it was his knowledge of this industry and understanding of the essentiality of castings in engineering construction that guided his decision during World War II when, in his late seventies, he answered a government call and went to Washington to serve as chairman of the Tools and Equipment Group, Priority Division of the Office of Production Management and later the War Production Board. For a part of the period I served in the production end of the Tools Division and had occasion to refer many requests for priorities to Dean Kimball. To my knowledge, he never refused a just and fair request for assistance from any foundry. The industry was indeed fortunate to have had him in charge of priorities during that emergency.

—o—

Good Publicity: The *Milwaukee Journal* must have a greater interest in the activities of industries in the area than is found among many metropolitan papers. This conclusion is based on the fact that the Sept. 13 issue carried a three-column story, 53-in. long and two photographs, all reporting a business sales meeting of Ampco Metal Inc., Milwaukee. I particularly liked the deck of the head which stated "Conference of Ampco's Staff Is an Example of How Firms Shift to Harder Hitting."

Perhaps the industry should get better acquainted with the business writers for our newspapers. F.G.S.

...Another job a Dings Magnet does better—

...Milwaukee Foundry uses Lifting Magnet to transport Heavy Castings from Shakeout

THAT'S a 39-inch Dings Lifting Magnet (above) in action at a steel company in Milwaukee.

This is one of the many firms that has learned that Dings Magnets are a fast, economical and manpower saving means of handling materials.

They can be used to charge tumbling barrels, load electric furnaces. And they're the most economical means of handling scrap metal anywhere.

Dings Lifting Magnets are available in diameters from 29″ to 65″ with capacities ranging to 6500 lbs. (slabs).

Maybe there's a job they can do better in your plant. Call your representative today and send the coupon for Catalog B-1401-A giving construction features capacities and other data.

Dings

DINGS MAGNETIC SEPARATOR CO.

4708 W. Electric Ave., Milwaukee 46, Wis.

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☐ Please have a representative call
☐ Please send me Catalog B-1401-A

Name_____ Title_____

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LM453

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is our role!

On the seas, in a foundry or a steel plant . . . *control* is essential. It's the chief role of Keokuk Electro-Silvery Pig Iron in charging the cupola or blocking the open hearth. For with Keokuk, you are *assured* of *accurate* percentages of silicon . . . and, as suits your melt, alloys of manganese, chrome or nickel in various combinations. So, control both quality and costs with Keokuk. Write today for complete information!

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Wenatchee Division: Wenatchee, Washington

In sailing, much depends upon control. Here, Chief Keokuk handles the tiller; Junior, the boom; and Princess Wenatchee makes ballasting an eye-popping pleasure!

Keokuk Electro-Silvery . . . available in 60 and 30 pound pigs and 12½ pound piglets . . . in regular or alloy analysis. Keokuk also manufactures high silicon metal.

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332 S. Michigan Ave., Chicago 4, Illinois • 3504 Carew Tower, Cincinnati 2, Ohio • 915 Olive St., St. Louis 1, Missouri.

WHIRLMIX

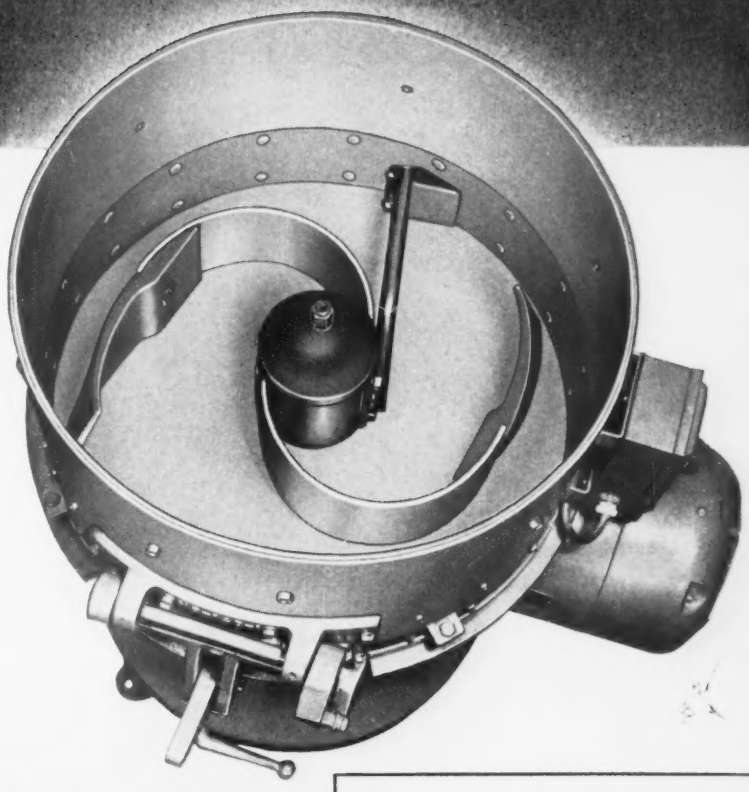
RUBBING ACTION PROTECTS SAND AS IT MIXES

• More thorough mixing *without* crushing or heating—more sand mixed per hour at lower cost—these are the big advantages provided by WHIRLMIX sand mixers.

Flexible, spring steel, whirling arms rub and squeeze sand with a regulated pressure that compensates for any variation in the amount of sand being mixed. *Correct* mixing pressure is always assured, to prevent the crushing or heating of sand grains. This exclusive mixing action produces a fluffy, well-aerated sand mixture. Because sand grains are not crushed, permeability can be maintained. Because sand is not heated, moisture can be controlled. And, because mixing is extremely thorough, a *minimum* amount of oil or cereal binders will produce maximum bond.

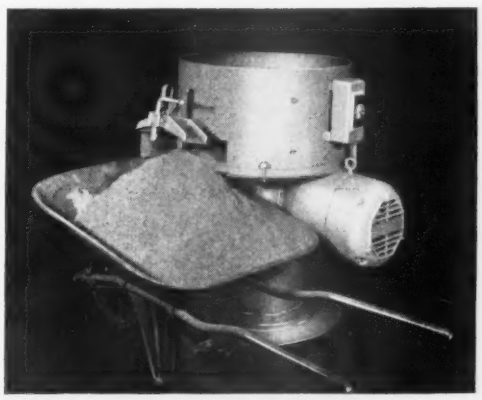
The whirling arms whirl sand from center to sides of the mixer, where the rubbing action takes place. Sand is firmly squeezed and rubbed between the rubbing shoes and mixer wall. Sand is squeezed upwards until it falls back into center of pan, where it is again picked up by the whirling arms to go through another mixing cycle.

WHIRLMIX mixers are easy and economical to maintain. Lower inner wall is tough, wear-resistant, synthetic rubber—bottom plate and rubbing shoes are long-wearing, high carbon steel—easily replaceable when necessary. WHIRLMIX mixers occupy little floor space, do not require foundations and are easily moved by crane or lift truck.



	BATCH SIZE		
	Core Oil Sand	Facing Sand	Dry Core Comp.
Lab. Model	15 lbs.	10 lbs.	10 lbs.
No. 100	100 lbs.	60 lbs.	60 lbs.
No. 300	300 lbs.	200 lbs.	200 lbs.
No. 600	600 lbs.	400 lbs.	400 lbs.
MIX TIME	3 min.	1½ min.	1½ min.

A new, 4-page, illustrated bulletin gives full particulars and specifications on all four models. Write for a copy for your file.



Discharge door, in models 300 and 600, is 28" above floor—high enough to accommodate a 3 cubic foot wheelbarrow.

FEDERAL'S LOWE SIFTER

Here's another money saver! An inexpensive, high-speed sifter with rotating-vibrating action . . . for faster sifting, better sand conditioning. Large, removable screen. Ample shovel clearance. Enclosed ball bearing motor. Write for complete data on the three popular models.

FEDERAL

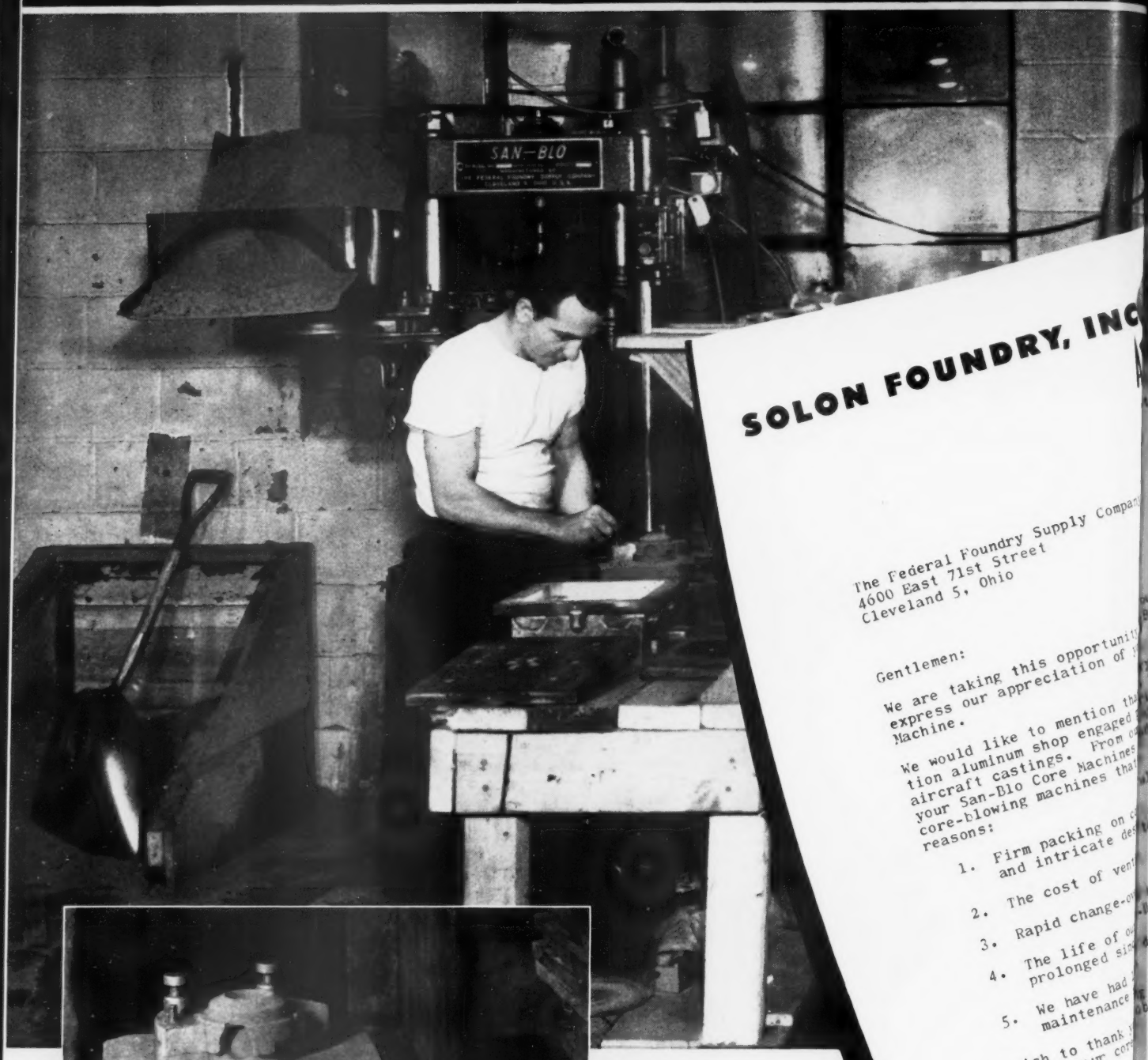
The FEDERAL FOUNDRY SUPPLY Company

4600 EAST 71st STREET, CLEVELAND 5, OHIO

CHATTANOOGA · CHICAGO · DETROIT · LOS ANGELES · MILWAUKEE · NEW YORK

SAN-BLO ... "answer to core bl

Patents Pending



SOLON FOUNDRY, INC

The Federal Foundry Supply Compan
4600 East 71st Street
Cleveland 5, Ohio

Gentlemen:

We are taking this opportunit
express our appreciation of
Machine.

We would like to mention th
tion aluminum shop engaged
aircraft castings. From
your San-Blo Core Machines
core-blowing machines that
reasons:

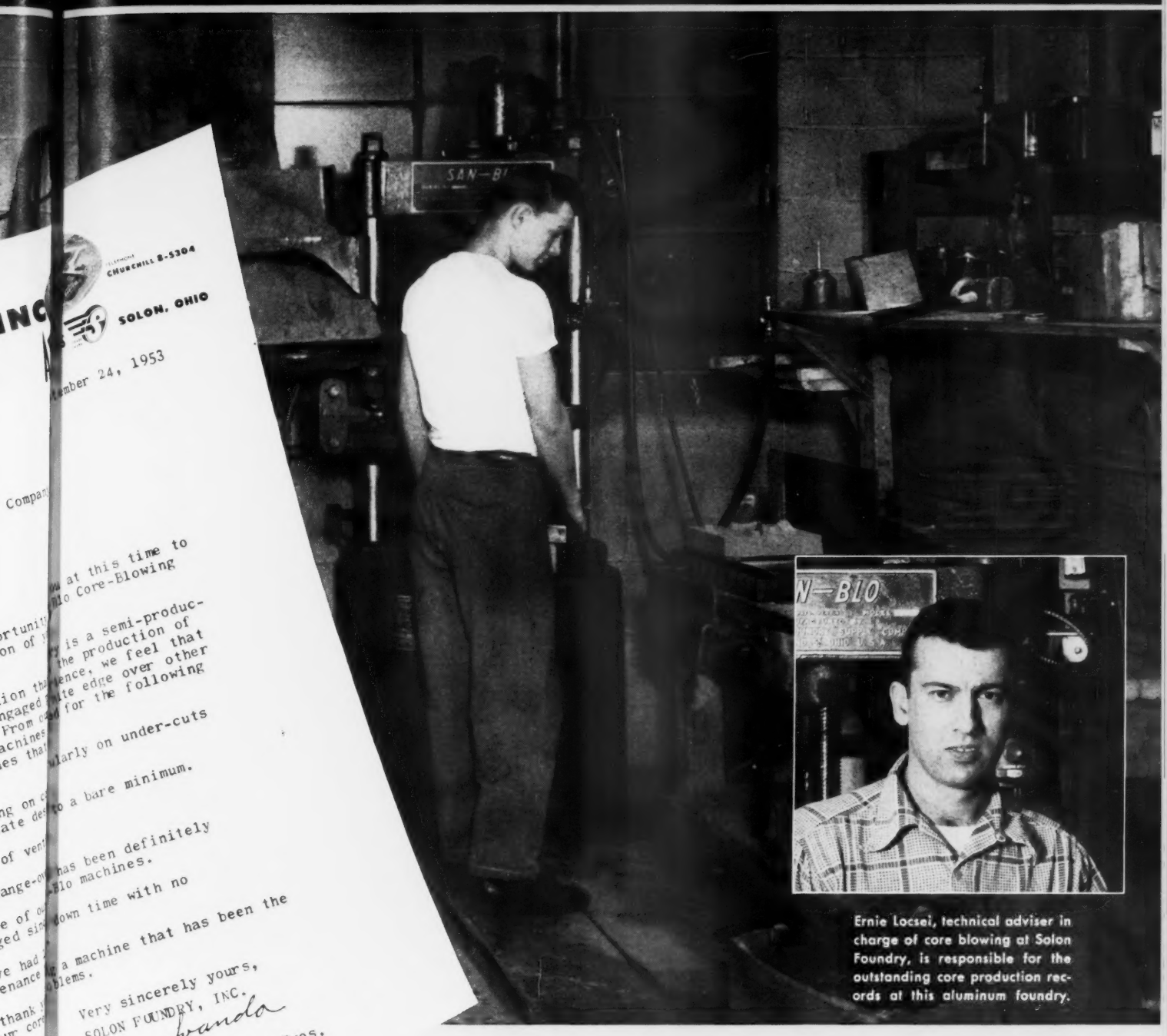
1. Firm packing on
and intricate de
2. The cost of ven
3. Rapid change-o
4. The life of
prolonged
5. We have had
maintenance

We wish to thank
answer to our

JS:EL

Close up of core box and 2-lb. core for aircraft pump, being produced on SAN-BLO in photo above. Two of the four loose pieces have been removed, showing undercuts and extreme intricacy of core. 22 completed cores are produced per hour on the SAN-BLO—more than double the previous hand work rate. Cores are blown to a firm, uniform hardness and finish—fully meeting the close tolerance requirements for this precision work.

...bling problems" at SOLON FOUNDRY



Ernie Locsei, technical adviser in charge of core blowing at Solon Foundry, is responsible for the outstanding core production records at this aluminum foundry.

WANT TO BLOW WOODEN BOXES? "Pulsator" model SAN-BLO machines divide the blowing cycle into a few short, quick blows instead of one continuous blow. This keeps air pressure within the core box extremely low—permits blowing wooden boxes *safely!*

WANT TO MINIMIZE CORE BOX WEAR? SAN-BLO machines with "LPP" (low pressure pre-fill) use low air pressure to fill core boxes, and then line pressure to pack the sand. Pre-filling with low pressure minimizes core box wear.

Write for information on "Pulsator" and "LPP" SAN-BLO models.

FEDERAL

The FEDERAL FOUNDRY SUPPLY *Company*

4600 EAST 71st STREET, CLEVELAND 5, OHIO

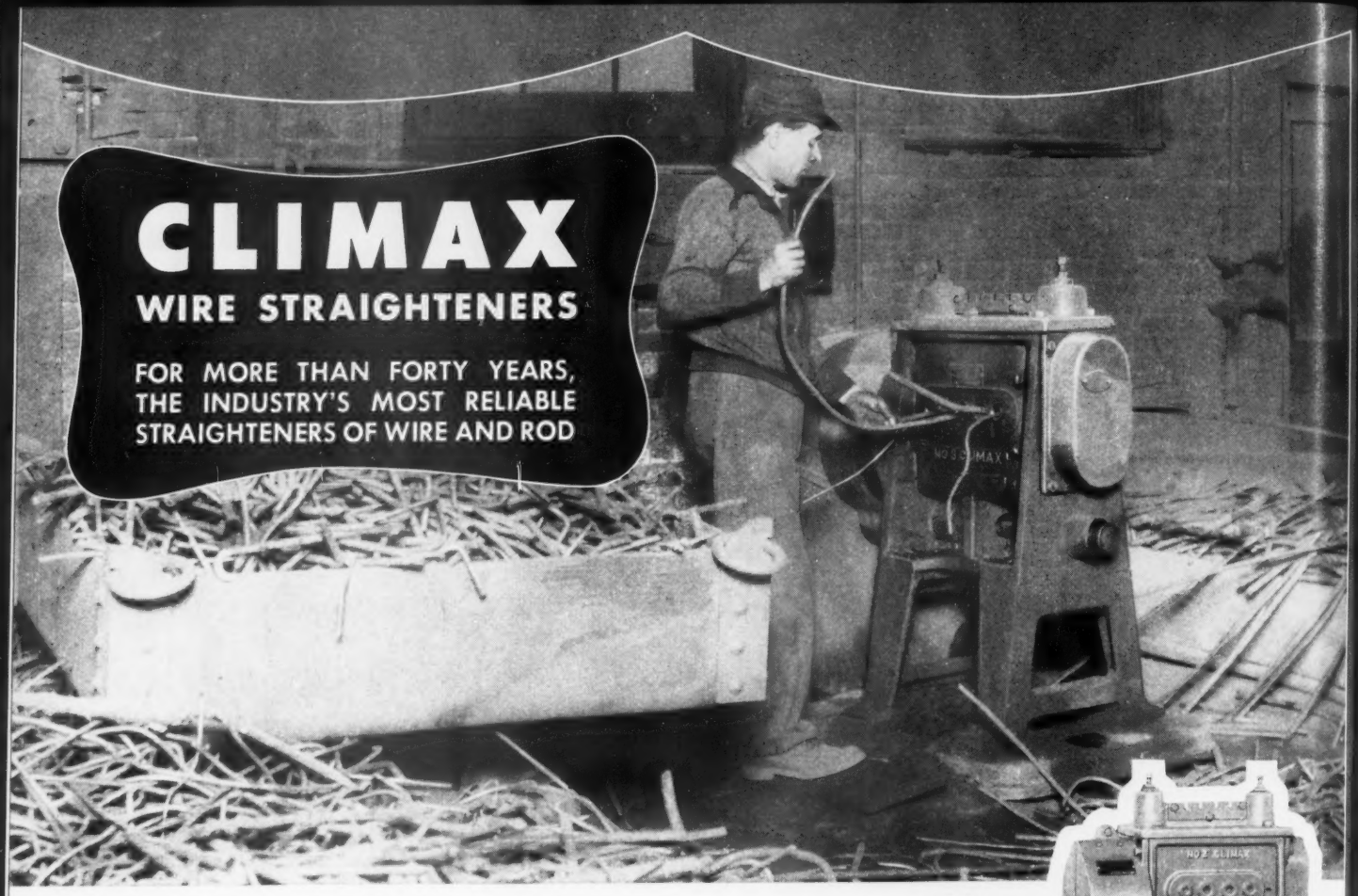
CHATTANOOGA · CHICAGO · DETROIT · LOS ANGELES · MILWAUKEE · NEW YORK

IN FRANCE—SA. PH. BONVILLAIN & E. RONCERAY, Rue Paul-Carle a Choisy-Le-Roi, Seine

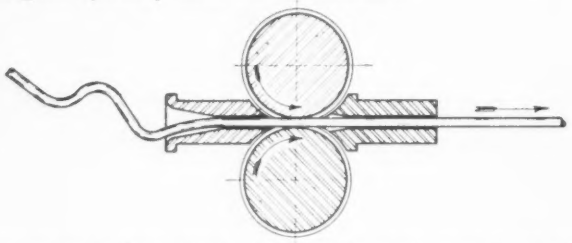
MEMBER FEMA FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION

CLIMAX
WIRE STRAIGHTENERS

FOR MORE THAN FORTY YEARS, THE INDUSTRY'S MOST RELIABLE STRAIGHTENERS OF WIRE AND ROD

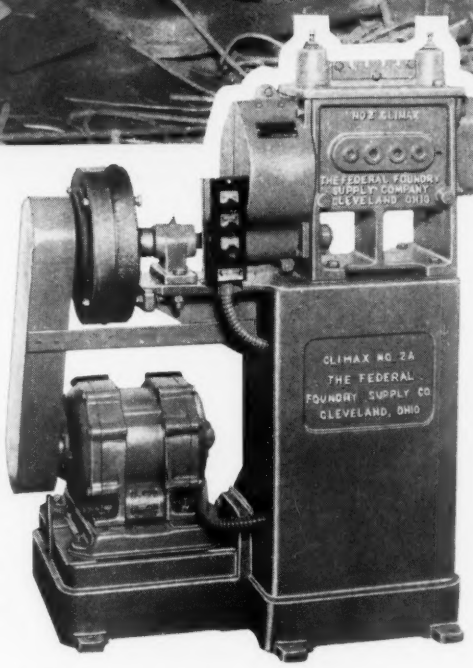


Reclaim your used core rods and wires and save money—with the CLIMAX. Operated safely and efficiently by unskilled labor. Straightens random lengths quickly and economically.



Bent wire is first checked in guide slots at top of the machine to determine proper feed hole, then inserted in feed hole, straightened between two heavy, alloy steel rolls under spring tension and ejected at back with a slight, natural bend, just right for core rod use.

Safety for the operator, as well as long life for the machine, is insured by enclosing gears and other moving parts. On motorized units, V-belts are enclosed and electrical wiring protected. Conveniently mounted controls and a reversible magnetic switch provide full protection for operator and straightening rolls, by enabling operator to stop or reverse machine instantly.


NO. 2 CLIMAX
THE FEDERAL FOUNDRY SUPPLY COMPANY CLEVELAND, OHIO
CLIMAX NO. 2A
THE FEDERAL FOUNDRY SUPPLY CO.
CLEVELAND, OHIO

MODEL 2A
motorized

Handles 4 wire sizes, 1/16" to 1/4". A complete unit, ready for operation when connected to current supply.

MODELS AVAILABLE

The CLIMAX is offered in three sizes: to handle 4 wire sizes from 1/16" to 1/4"—4 sizes from 3/16" to 1/2"—and 5 sizes from 1/4" to 3/4". Each size may be furnished in three styles, as follows:

(1) Completely motorized—ready to operate.
(2) With gear reduction unit for your motor.
(3) With extended shaft for your own drive.

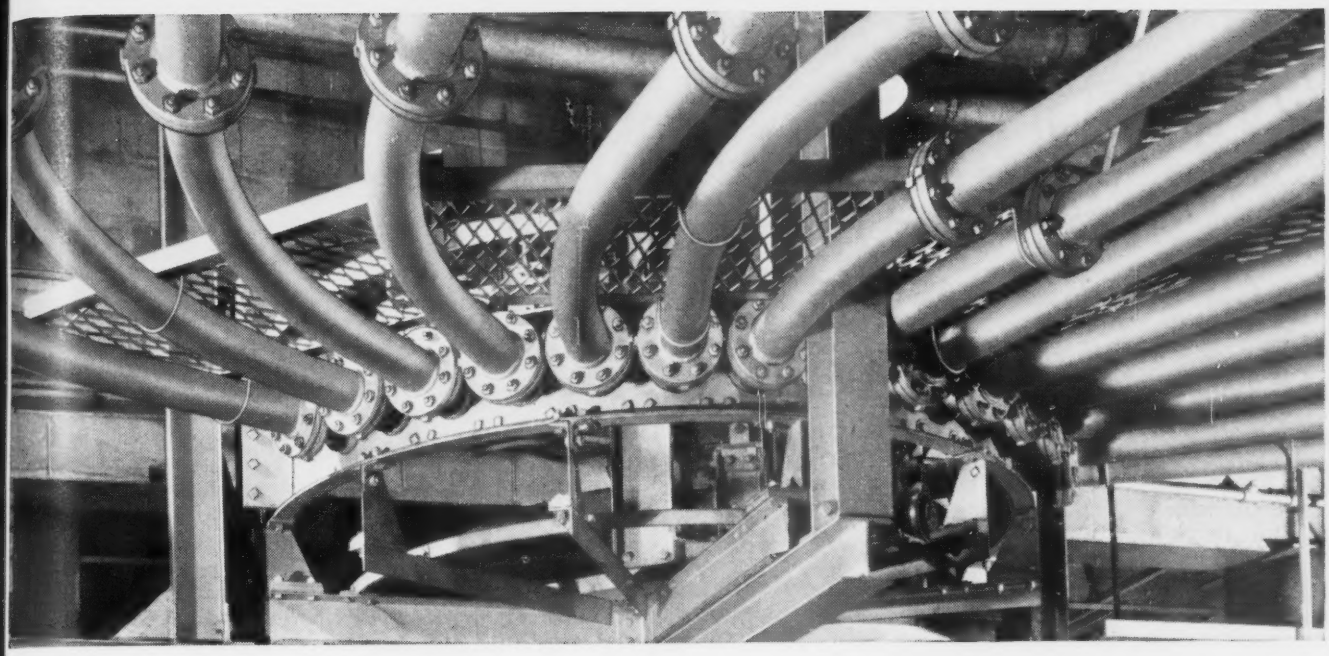
Write for additional information and prices, specifying wire sizes and model style.

FEDERAL

The **FEDERAL FOUNDRY SUPPLY** *Company*

4600 EAST 71st STREET, CLEVELAND 5, OHIO

CROWN HILL, W. VA. · CHICAGO · CHATTANOOGA · DETROIT · MILWAUKEE · NEW YORK · RICHMOND · LOS ANGELES · UPTON, WYO.



NEW WEAPON AGAINST RISING FOUNDRY COSTS!

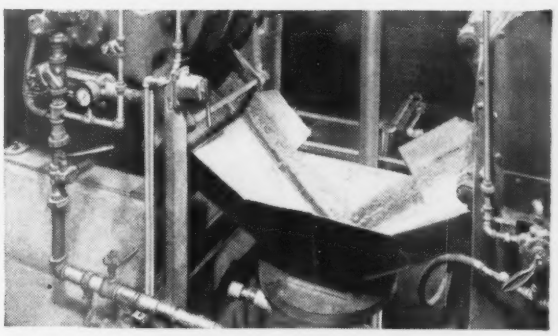
CRANE *TURBO-DRIVE* moves core sand in a breeze at famous EATON foundry

The awesome unit above is really very simple—but of extreme importance to the over-all efficiency of the Eaton Manufacturing Company foundry at Vassar, Michigan.

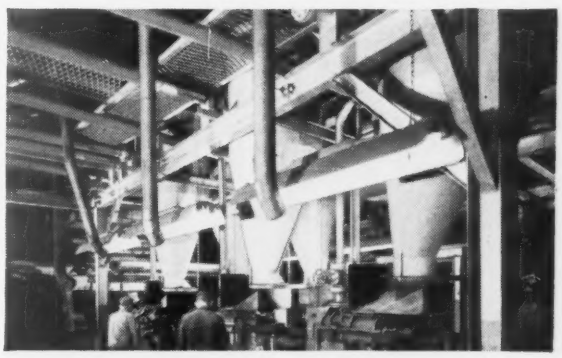
It's the multiple switch of the revolutionary Crane Turbo-Drive system that enables the muller operator to deliver a 400-pound batch of mulled core sand to any of fourteen core-blowers in seconds—and in complete safety. Economical compressed air provides the movement, and "go-anywhere" 4-inch steel piping is the conveyance. It's a cleaner, space-saving, sand-transporting system adaptable to any foundry.

But more important, Crane Turbo-Drive effects real savings in time, maintenance and man power—and actually increases production at the core-blowers. Eaton reports up to 15% greater output. *And all this at a lower initial cost than any equivalent sand-transporting system.*

Make it a point to mail the coupon today!



Driver unit of Crane *Turbo-Drive* system is directly below mullers. Unit shown is 7 cu. ft. capacity. 15 and 30 cu. ft. models available.



Production is up at the 14 core-blowers served by Crane *Turbo-Drive* through a single multiple switch. Single transfer switches may also be used.

CRANE CO.

General Offices: 836 S. Michigan Ave., Chicago 5, Illinois
Branches and Wholesalers Serving All Industrial Areas.

VALVES • FITTINGS • PIPE • PLUMBING • HEATING

CRANE CO., Turbo-Drive Division
836 S. Michigan Ave., Chicago 5, Illinois

Gentlemen: Yes, I would like Turbo-Drive literature ( ); please have a representative call ( ).

Name_____ Title_____

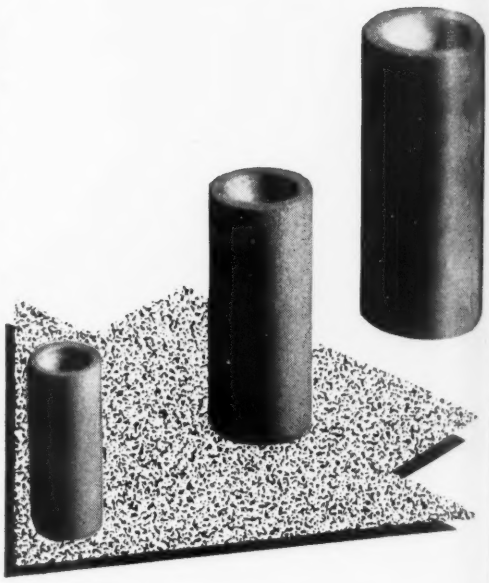
Company_____

Address_____

City_____ Zone____ State_____

THREE REAL REASONS WHY

you should use the NORBIDE Pressure Blast Nozzle:

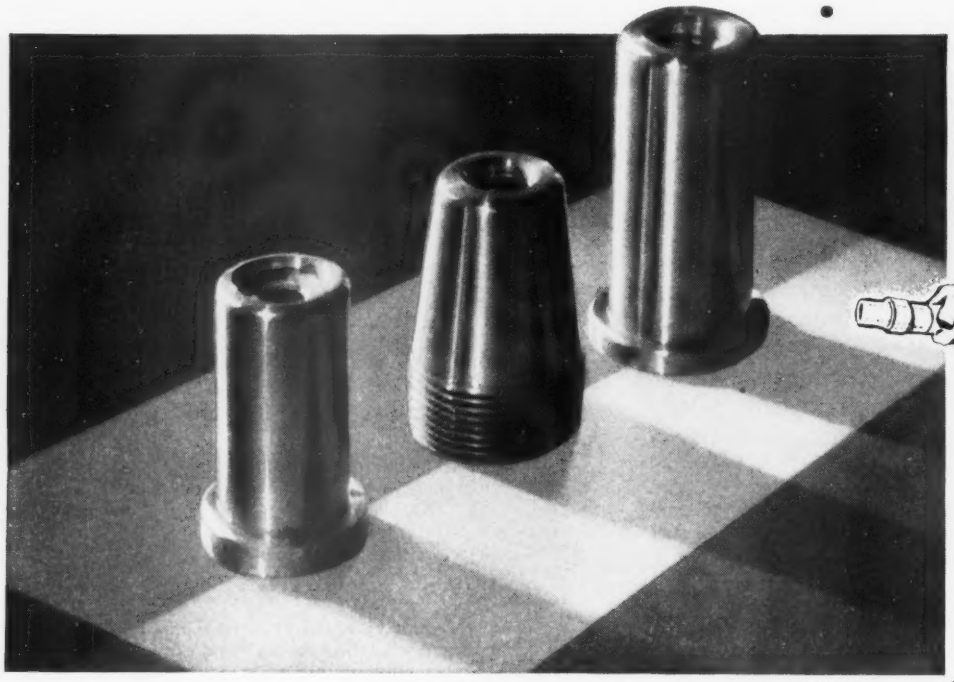


1. More service per dollar cost (750 hours silica sand — 1500 hours steel grit or shot). Norton guarantees this minimum service.

2. Decreases air consumption from 10 to 20 percent as compared with iron nozzles.

3. Maintains stream contour and abrasive velocity.

NORTON COMPANY
WORCESTER 6, MASSACHUSETTS



Only the diamond is harder than Norbide

NORTON

Making better products to make other products better

BIG BUSINESS FOR SMALL FOUNDRIES NOW POSSIBLE

New Shell Molding Machine Makes Small and Large Production Runs Possible With No Increase in Space or Additional Help

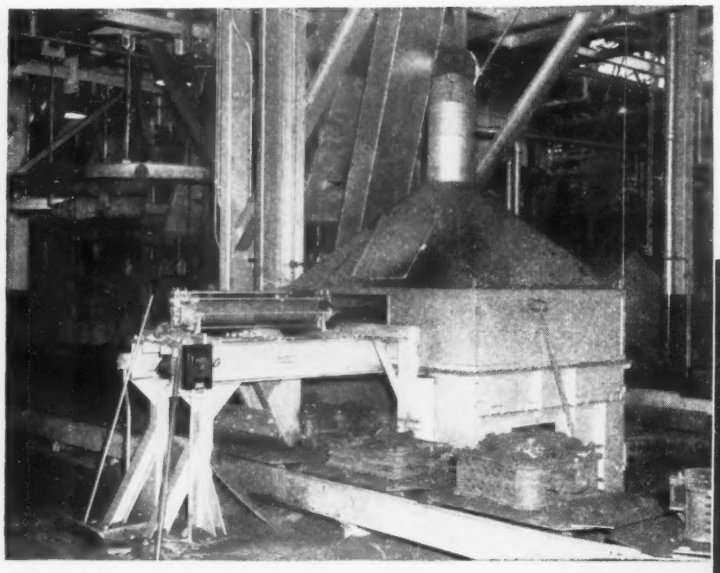
No special skills are required to run this automatic shell mold machine – one operator can turn out 450 shell molds per eight hour day. Pouring can be more than doubled without increase in space. Depending on size, five or six shell molds occupy little more space than two conventional molds. Castings have smoother finish with closer tolerance. Reduces or entirely eliminates some machining operations. Write today for full information.

*Assembly line production of these machines makes **4 weeks delivery** possible.*

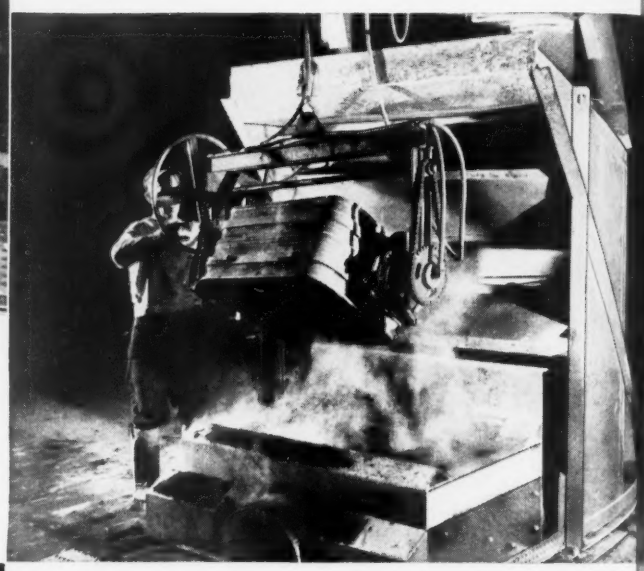
Shell Process, Inc.

340 McKinstry Avenue
CHICOPEE, MASSACHUSETTS

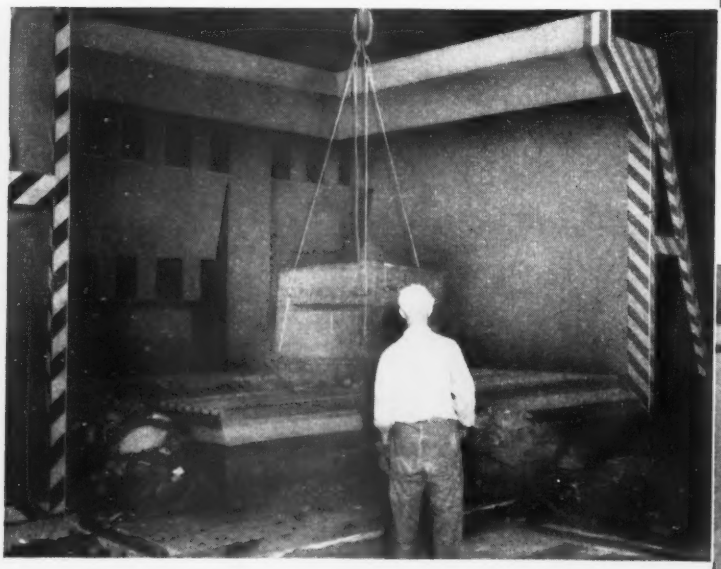
Let's have a SHOWDOWN



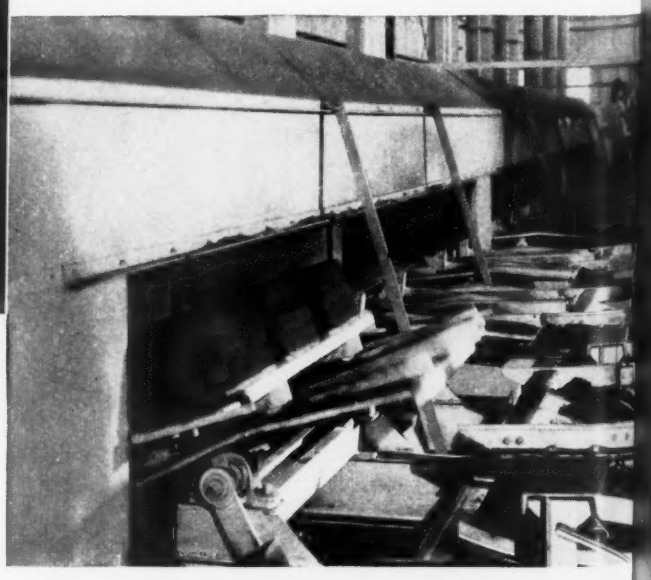
Enclosed hood providing complete enclosure with openings for flask upsetting and casting removal. Most economical design for removal of dust and gases.



Side hood designed for shakeouts up to 8-ft. wide where material handling methods prevent more complete enclosure.



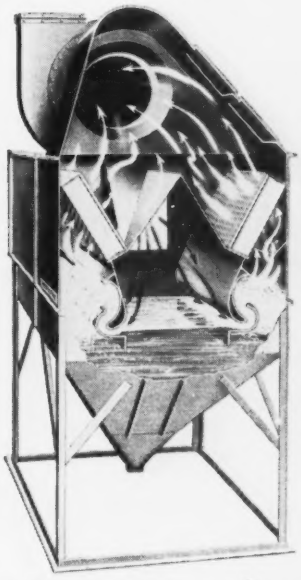
Side hood designed for shakeouts over 8-ft. wide requiring overhead material handling. Side shields seldom interfere with crane operator, yet cut cost of installation by reducing size of Roto-Clone required.



Special hood design for semi-mechanized foundry where molds are upset to floor openings at end of gravity rolls located at each molder's station.

SHAKEOUT Dust Control!

The Right ROTO-CLONE PLUS Proper Hood Design Will Solve Your Problems

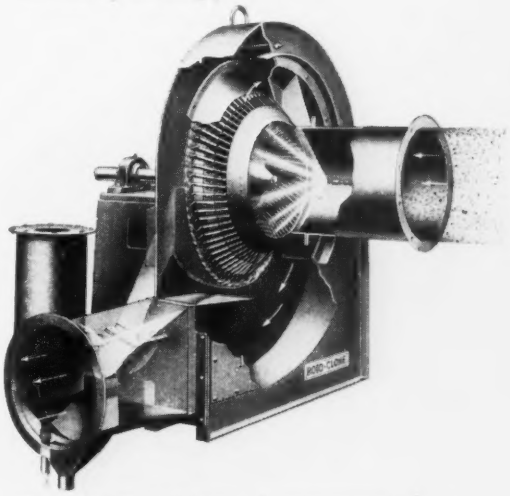


Type N Roto-Clone Arrangement D — cutaway shows dual impellers and distinctive water curtains created by air flow. Highest efficiency maintained without aid of moving parts.

Too many foundries are still operating shakeouts as "dust nuisances," both to themselves and to their neighborhoods. The reason—because of such factors as (1) flask and casting size and flow, (2) existing material handling equipment and (3) cost of dust control systems, it is *assumed* that efficient dust control is either impossible or impractical.

Roto-Clone* accepts all these variables as *influencing* but *not limiting* factors. The AAF line of Roto-Clone equipment offers a type and capacity unit to economically handle the larger volumes and lighter loads typical of many a shakeout. But that's only half the story! AAF engineers analyze each shakeout operation—then prescribe and design the type of hooding that will provide maximum dust removal at point of generation without hampering your foundry production.

This kind of "dust engineering" has cleaned up many a problem shakeout. Before you say, "It can't be done," call your local AAF representative or write us direct. We like the tough ones!



Type W Roto-Clone Arrangement A — cutaway showing how integral water sprays are combined with dynamic precipitation for high efficiency collection at low cost.

*ROTO-CLONE is the trade-mark (Reg. U.S. Pat. Off.) of the American Air Filter Company, Inc., for various dust collectors of the dynamic precipitator and hydrostatic precipitator types.

AAF

American Air Filter COMPANY, INC.

266 Central Avenue, Louisville 8, Kentucky • American Air Filter of Canada, Ltd., Montreal, P. Q.

Bring out the hidden profits in your rough grinding with the

"TOUCH OF GOLD"

Too often rough grinding is regarded as a necessary evil, a red ink entry on the production ledger.

The fact is that rough grinding jobs *can* be — and *should* be — as definite money-making operations as any other form of grinding.

And they *will* be when you add the "Touch of Gold" with Norton wheels that are exactly right—as to abrasive, bond and every other detail—for the work you're doing on the machines you're using.

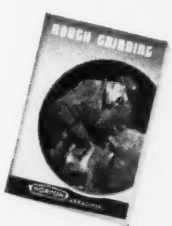
Then you'll grind off more metal per dollar, increase production and cut costs every day, on countless routine jobs.

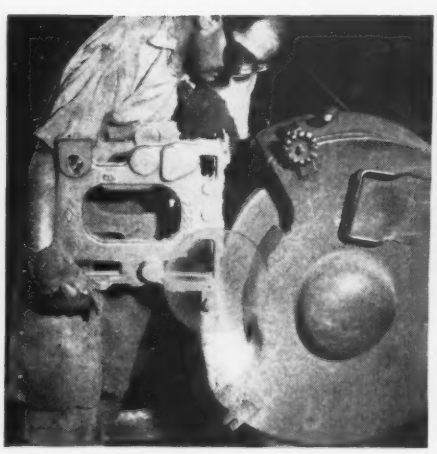
And you'll realize that the *hidden profits* in your rough grinding operations need only this time-and-money-saving "Touch of Gold" to bring them to light.

Your Norton Distributor

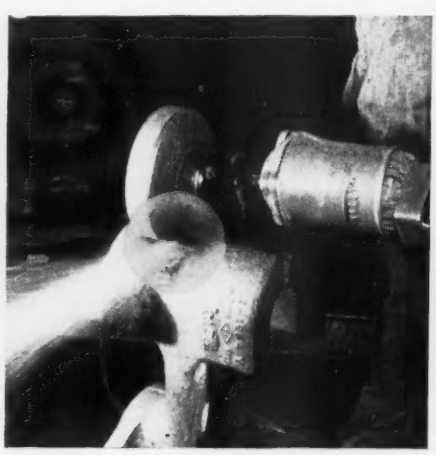
can bring long, practical experience to your rough grinding problems. If necessary, he'll call in your Norton Abrasive Engineer for expert advice on any new or difficult applications. Backed by the world's largest manufacturers of abrasives, with the broadest line to choose from, these Norton men will make sure you get exactly the wheels you need for best results.

Ask your Norton Distributor for Booklet No. 1405 . . . 54 illustrated pages covering every phase of rough grinding. Or write direct to NORTON COMPANY, Worcester 6, Mass. Distributors in all principal cities — listed under "Grinding Wheels" in your telephone directory yellow pages. *Export:* Norton Behr-Manning Overseas Inc., Worcester 6, Mass.

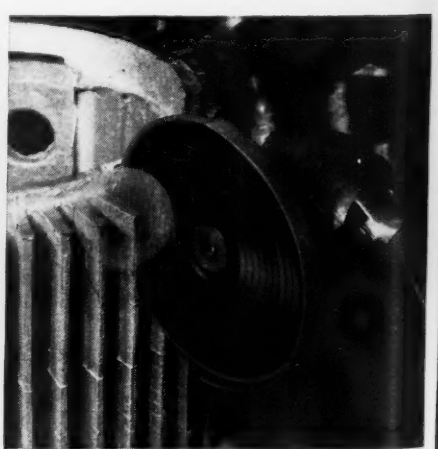




On floor stands you grind faster, at lower cost with Norton ALUNDUM or CRYSTOLON wheels. There's a right Norton abrasive-and-bond combination for every metal, every job.



On portable grinders the smaller Norton wheels do the same big job of cost cutting. With their inbuilt balance they *hug that work* — to grind more metal per man-hour.



On many jobs the versatile Norton Nylon-Reinforced Hub Wheels — BD rigid and BFR semi-flexible—are the fastest, easiest, *safest* wheels to use. They're ideal for weld grinding and similar finishing operations.

On swing frame grinders Norton wheels stand up under heavy grinding pressures at high speeds, combining fast, clean cutting action with extra long wheel life. For high tensile strength metals use ALUNDUM*abrasive; for low tensile metals, CRYSTOLON*abrasive.

NORTON
ABRASIVES

W-1497

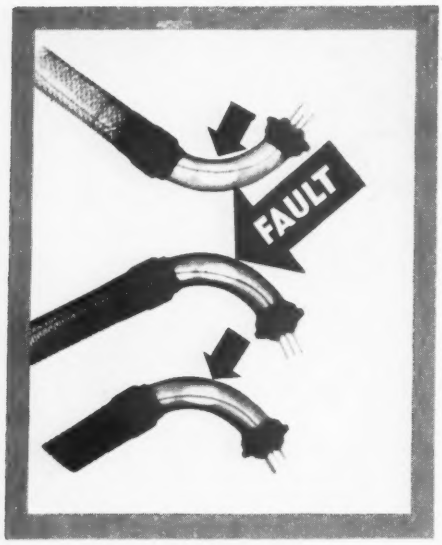
Making better products . . . to make other products better

*Trade-Marks Reg. U.S. Pat. Off. and Foreign Countries

one minute

is all it takes to get finished, dry radiographs

* NOTE: Reduction to 1/5 size, combined with image decay incident to the printing process, seriously degrades in these miniature reproductions the fine detail of the 10" x 10" originals.

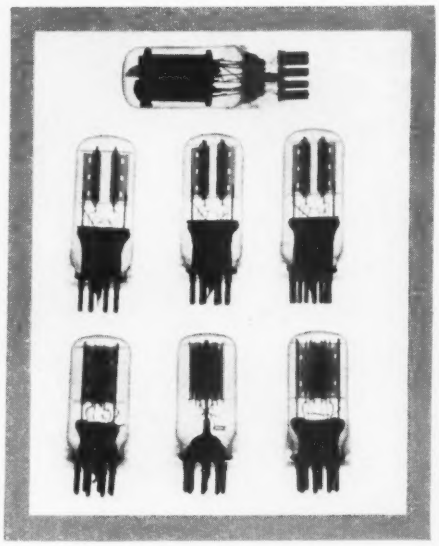


Subject: **IGNITION CABLE ELBOW** (Ignition cable elbows filled with insulating sealing compound.)

Objective: To confirm winding spacing alignment of center wire.

Disclosed: Gas bubbles in elbows where compound failed to fill.

like

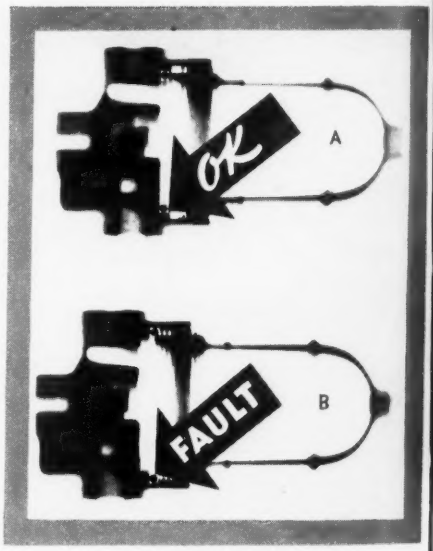


Subject: **ELECTRONIC TUBES**

Objective: To confirm alignment and spacing of elements.

Disclosed: All elements correctly oriented.

these*



Subject: **CAST ALUMINUM GASOLINE FILTER**

Objective: To confirm correct placement of gasket after completion of assembly.

Disclosed: (A) Correct assembly (B) Fractured gasket slipped out of place.

with PICKER-POLAROID

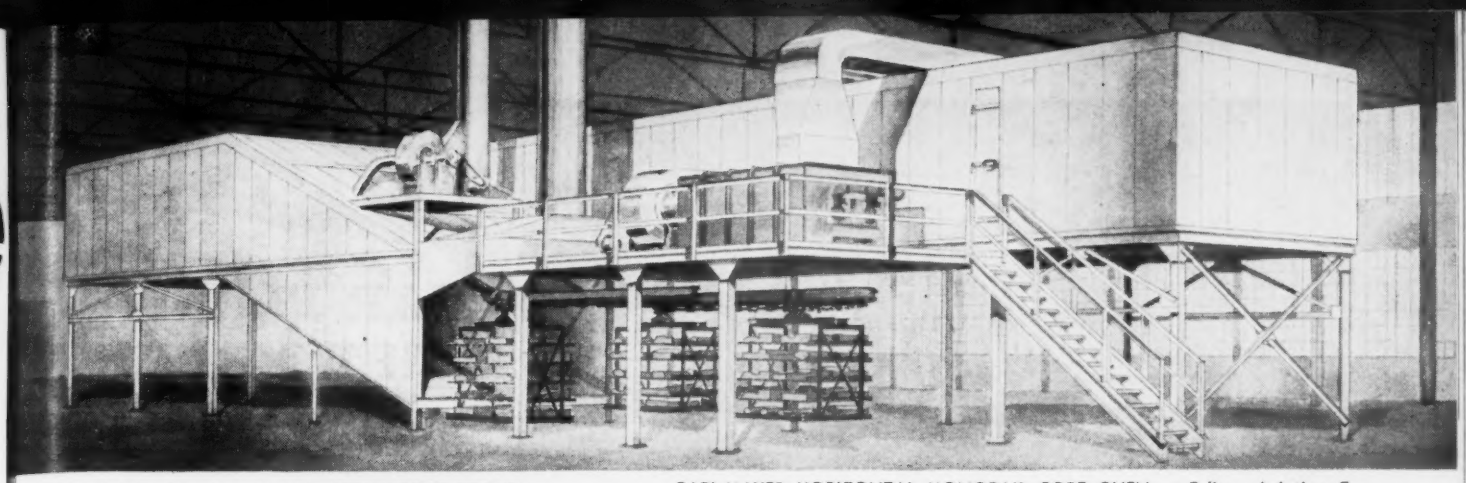
the "rightaway" radiograph

Make the exposure and get the finished, dry radiograph a minute later . . . right where you are, in *broad daylight,* if need be. Because the Polaroid x-ray packet processes itself, you don't need a darkroom, or tanks of solutions, or dryers, or even an illuminator to view it. All you need is your source of x-rays, a supply of packets, and the compact processor unit which automatically delivers the finished radiograph.

Maybe there's a place for this quick x-ray inspection method somewhere in your operation. Ask your local Picker office to help you explore your problem, or write

PICKER X-RAY CORPORATION
25 SOUTH BROADWAY, WHITE PLAINS, N. Y.

Picker x-ray POLAROID

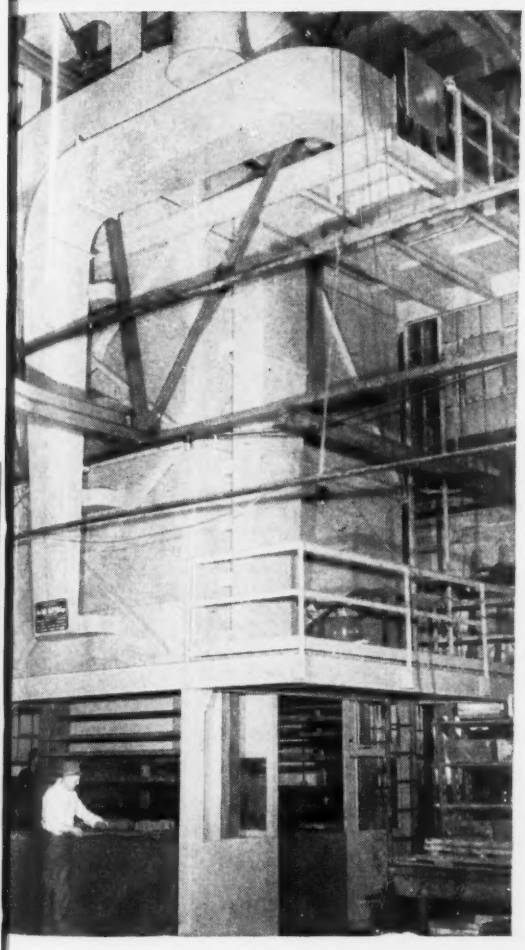


CARL-MAYER HORIZONTAL MONORAIL CORE OVEN at Eclipse Aviation Co.
Patent No. 2355814

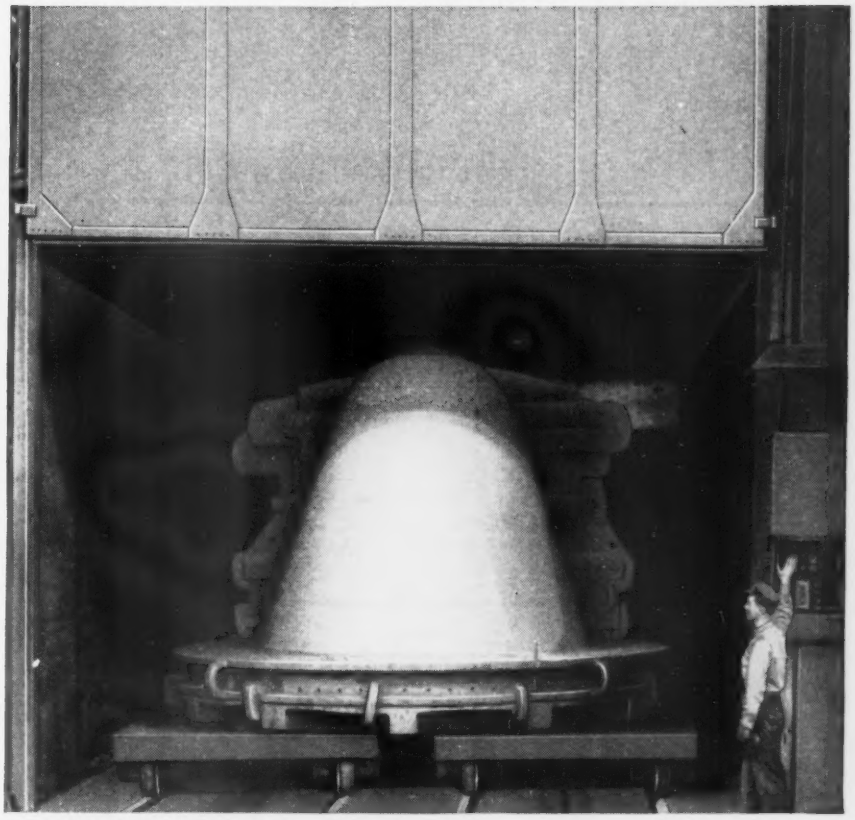
"BIG" Engineering brings big foundry oven jobs to CARL-MAYER

Carl-Mayer designs embody patented features which contribute to highest efficiency and economy in operation. It will pay you to consult us on your next core baking and mold drying problem. We build ovens of all types and sizes, also other types of industrial ovens and furnaces.

Write For Bulletin No. 53-CM.



CARL-MAYER VERTICAL CORE OVEN
at G. & C. Foundry Company
Patent No. 2257180.



CARL-MAYER MOLD OVEN. One of a battery of two at Pittsburgh Steel Foundry Corp. Capacity: 100 tons per charge (each oven). PATENT APPLIED FOR.

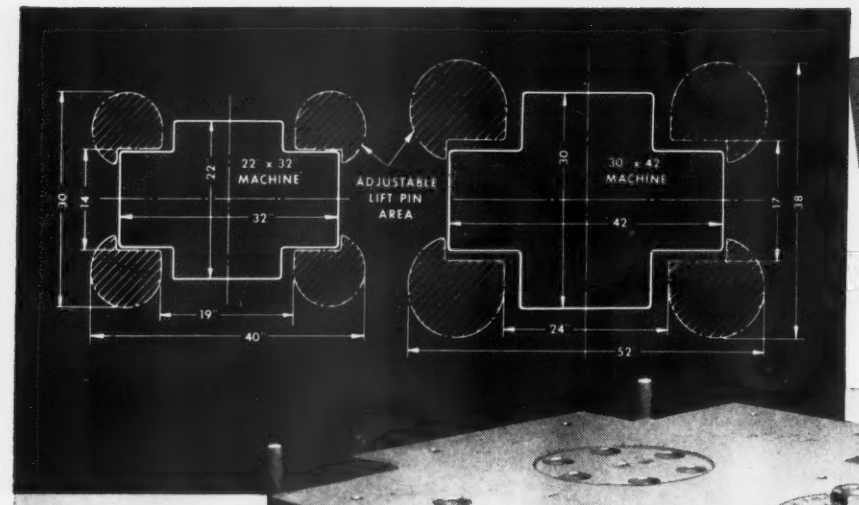
CARL-MAYER CORE AND MOLD OVENS ARE SERVING CONCERNS LIKE THESE:

minum Co. of America
erican Brake Shoe Co.
erican Radiator Co.
w-Knox Co.
wn Industries
ck Motor Div. of General Motors Corp.
yrus-Erie Co.
dillac Motor Div. of General Motors Corp.
umbia Steel Corp. (U. S. Steel Corp.)
cible Steel Castings Co.
kirk Radiator Co.
pse Aviation Division of Bendix Aviation Corp.
ctric Autolite Co.
d Motor Co.
mont Foundry Co.
& C. Foundry Co.
eral Electric Co.
eral Motors Corp. and Subsidiaries
Gilbert & Barker Co.
General Steel Castings Co.
Golden Foundry Co., Inc.
Henry Kaiser Corp.
W. O. Larson Foundry Co.
Mesta Machine Co.
F. E. Meyers & Bro. Co.
Oil Well Supply Co. (U. S. Steel Corp.)
Packard Motor Car Co.
Pittsburgh Steel Foundry Corp.
H. B. Salter Co.
Shenango Penn Mold Co.
Standard Foundry Co.
Union Brass & Metal Mfg. Co.
Union Steel Castings Co.
West Michigan Steel Castings Co.
A. C. Williams Co.
Whiten Machine Works
Whiting Corp.

THE CARL-MAYER CORP.

3030 Euclid Ave., Cleveland, Ohio

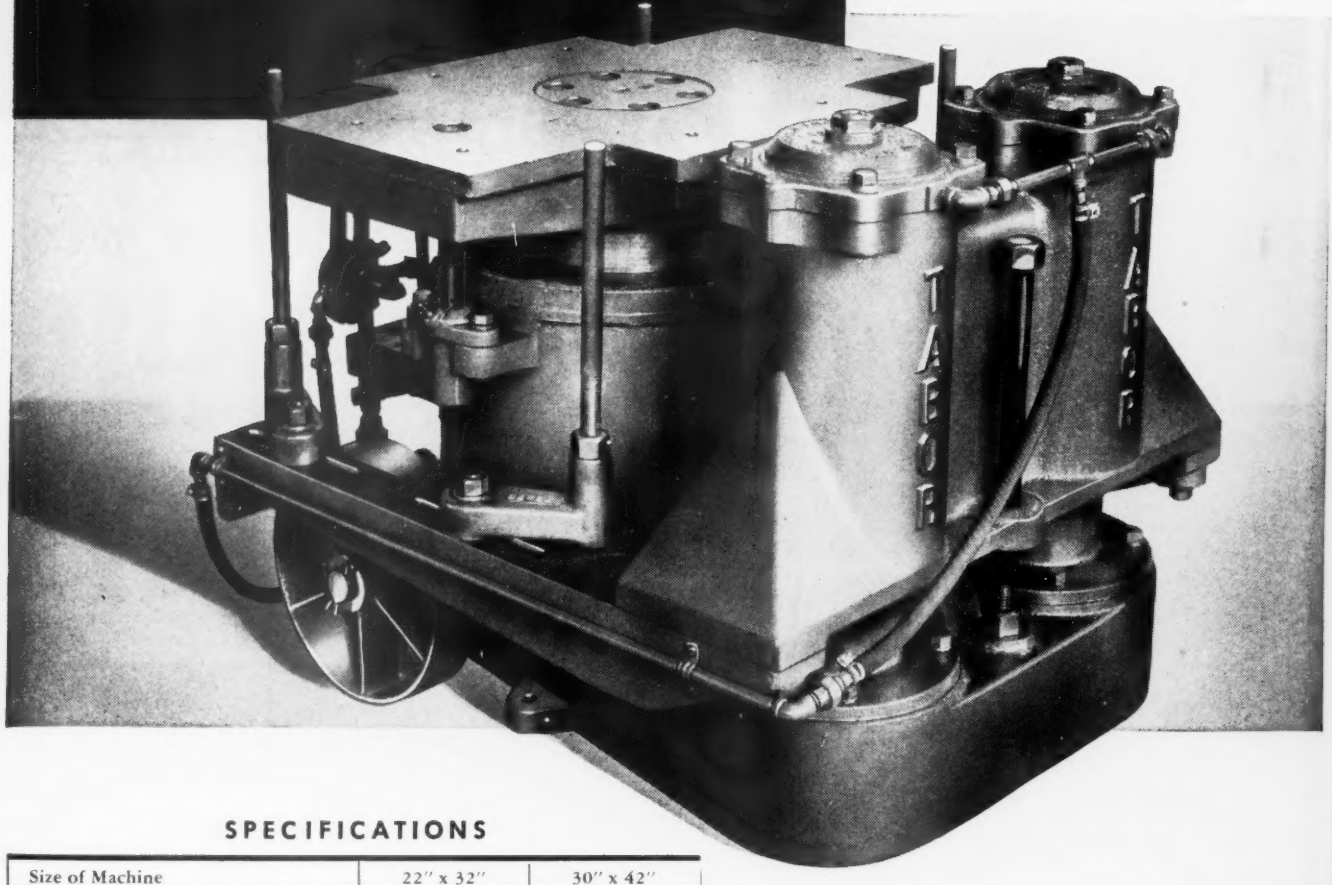
Backed by reputation and over 30 years' experience



Tabor

JAR FLASK LIFT MACHINE

Equipped with Adjustable Lift Pins



SPECIFICATIONS

Size of Machine	22" x 32"	30" x 42"
Table Size	22" x 32"	30" x 42"
Capacity—80# Air	600#	1000#
Patt. Draw.—Plain Jar	10"	12"
Patt. Draw.—Shockless	9"	12"
Lift Pin Adjustment	See cut	See cut
Max. Width Flask with Center of Flask on Center of Jar Mach.	30"	38"
Min. Width Flask	14"	17"
Max. Length of Flask	Unlimited within capacity of machine	
Patt. Draw.	Oil Controlled—Slow & Fast	
Height Table from Floor—Portable	28"	32"
" " " " Stationary	26"	30½"
Portable Mach. 3 Wheels	12" Dia. 3" Face 14" Dia. 4" Face	
Stationary Mach.	3 Foundation Bolts	
Weight Shockless Jar	2600#	4000#
Weight Plain Jar	1900#	2700#

THESE new Tabor Flask Lift Machines allow working access from three sides. Flask-lifting pins are adjustable for different lengths and widths of pattern plates, thereby covering a wide range of flask sizes. Machines are furnished either plain or shockless jar, in two table sizes—either stationary or portable. We will be glad to send prices and further information at your request.

REPRESENTATIVES

Snyder Foundry Supply Company, Los Angeles, Calif.; The Pacific Graphite Company, Inc., 40th & Linden Sts., Oakland 8, Calif.; Carl F. Miller & Company, Seattle, Washington, Harry H. Reich, Trussville, Ala.

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

The TABOR *Manufacturing Co.*

SINCE 1884 MANUFACTURERS OF FOUNDRY MOLDING MACHINES

6225 TACONY STREET • PHILADELPHIA 35, PENNA.

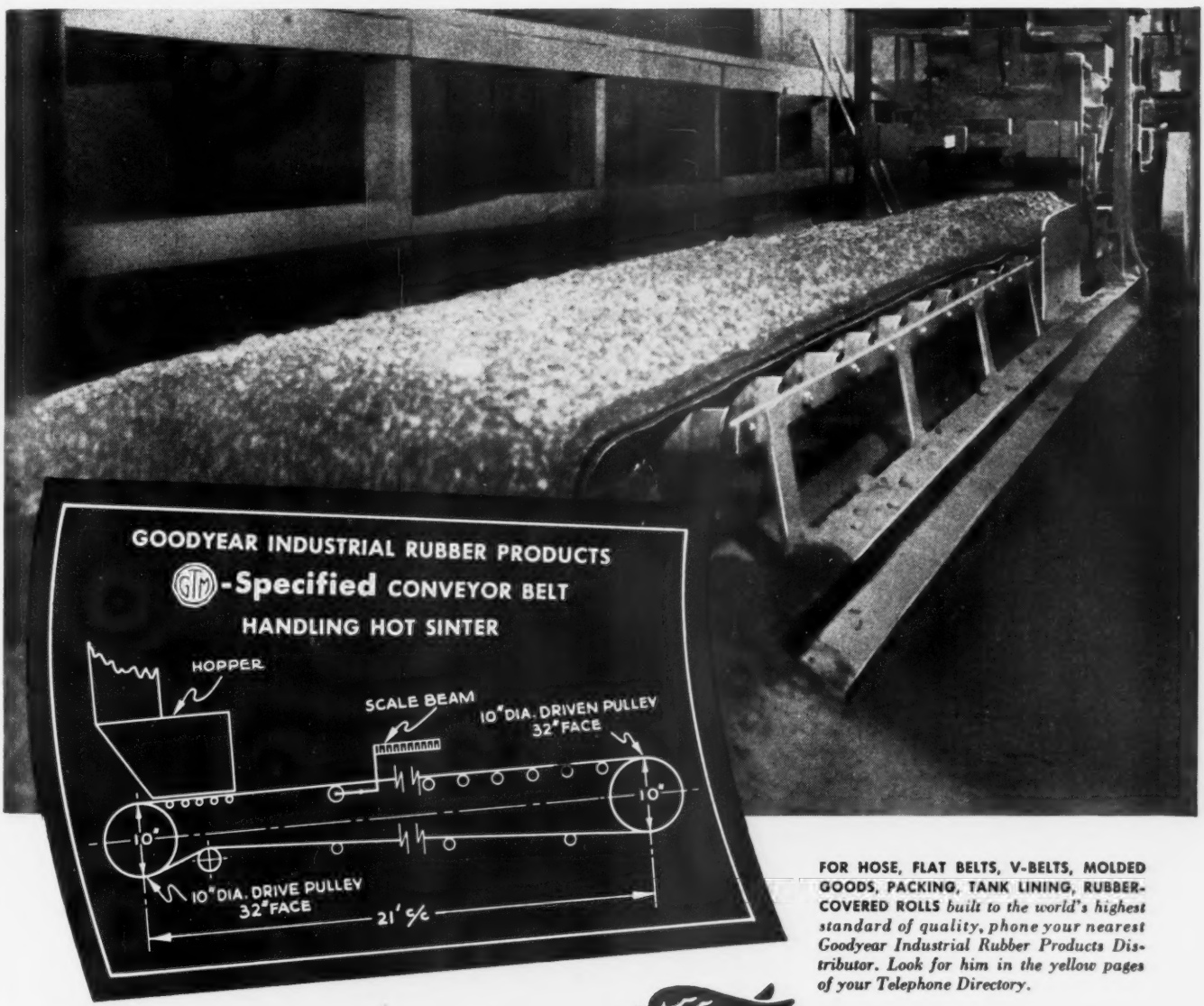
EXPORT DEPARTMENT, 751 DREXEL BLDG., PHILADELPHIA 6, PA.

Triple Service

Goodyear Conveyor Cuts Belt Cost $413—while handling almost three times the tonnage of the previous belt

Ordinary 5-ply conveyors handling hot sinter at 200°-300° F. failed in three months or less because of heat, caustic attack on the belt and small drive pulleys. The best record was 23,545 tons before failure on the top cover.

Then the G.T.M.—Goodyear Technical Man—recommended a 3-ply Goodyear Style 6740 "Hot" Belt. It outlasted any other belt ever tried—served almost 9 months—handled 68,750 tons of material. This thinner belt gave closer control on the weighing device measuring out sinter as well—saved an estimated $413.44 ($6.08 per M tons) on belt costs alone!

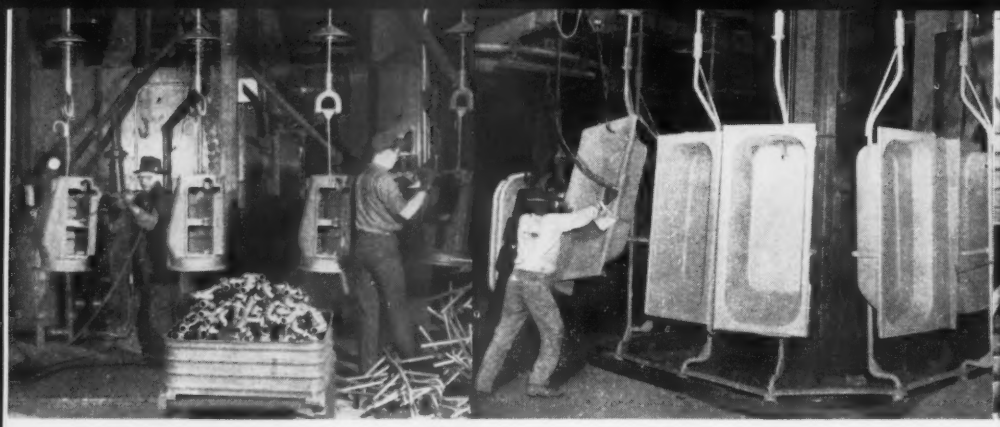


FOR HOSE, FLAT BELTS, V-BELTS, MOLDED GOODS, PACKING, TANK LINING, RUBBER-COVERED ROLLS *built to the world's highest standard of quality, phone your nearest Goodyear Industrial Rubber Products Distributor. Look for him in the yellow pages of your Telephone Directory.*

GOODYEAR

THE GREATEST NAME IN RUBBER

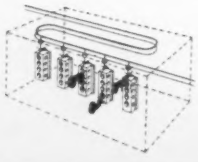
We think you'll like "THE GREATEST STORY EVER TOLD"—Every Sunday—ABC Network—THE GOODYEAR TELEVISION PLAYHOUSE—Every other Sunday—NBC TV Network



.EANING TRACTOR CASTINGS at

nneapolis-Moline

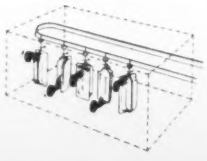
ylinder blocks, heads, crankcases, manifolds, c. are cleaned at the rate of one hook a inute in this 3-pass, indexing, spinner-anger type Monorail Cabinet. As many as six astings can be hung on one hook. Replacing large airblast room, this Wheelabrator abinet eliminated a cleaning bottleneck by oviding continuous, automatic cleaning with minimum of parts handling.



CLEANING BATHTUBS at

a Sanitary Ware Plant.

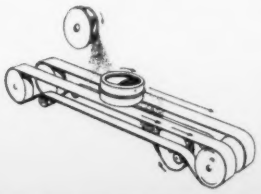
A 2-pass, constant travel, spinner-hanger type Wheelabrator Monorail Cabinet was designed for a large Southern manufacturer of sanitary ware. It handles large bathtubs as well as smaller ware. Production: 120 bathtubs, or 960 sinks and 720 washbowls per hour. Like other sanitary ware manufacturers, they have discovered that a Wheelabrated surface provides a superior base for enameling.



CLEANING BRAKE DRUMS at

Centrifugal Fusing Co.

Two Continuous Rubber Belt Wheelabrator Cabinets installed at Centrifugal Fusing Co. provide fast continuous cleaning in the manufacture of centrifugally cast brake drums on a high production basis. One cabinet cleans 9", 10" and 11" double brake drums at the rate of 1450 hourly. The other cleans 875 double drums per hour varying from 12" to 20".

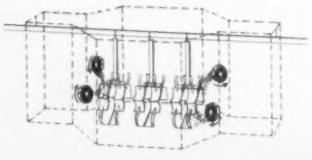


9 plants—9 industries—9 cleaning

LEANING TEXTILE CASTINGS at

rompton-Knowles

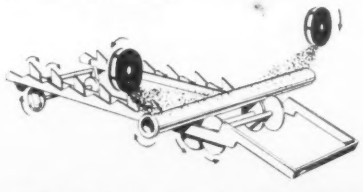
single pass, constant travel, hanger-type Wheelabrator Cabinet cleans 30 to 40 tons f gray iron castings daily at Crompton-nowles Loom Works. This Cabinet replaced wo large airblast rooms, three rotary tables nd two large rattlers. One hundred textile oomsides are now cleaned in 2½ hours in he Wheelabrator compared to 13 hours for 2 loomsides by former methods. Manpower equirements were cut 50%.



CLEANING SOIL PIPE at

Herco Foundry Co.

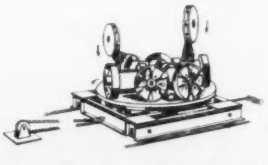
A production of 500 to 660 lengths of soil pipe is maintained hourly in this Wheelabrator Cabinet at Herco Foundry Co. It replaced a battery of tumbling mills. Pipe is conveyed horizontally through the machine on a shuttle beam conveyor. A spinner station rotates the pipe in the blast zone to expose all surfaces for thorough cleaning. Operations are continuous and automatic.

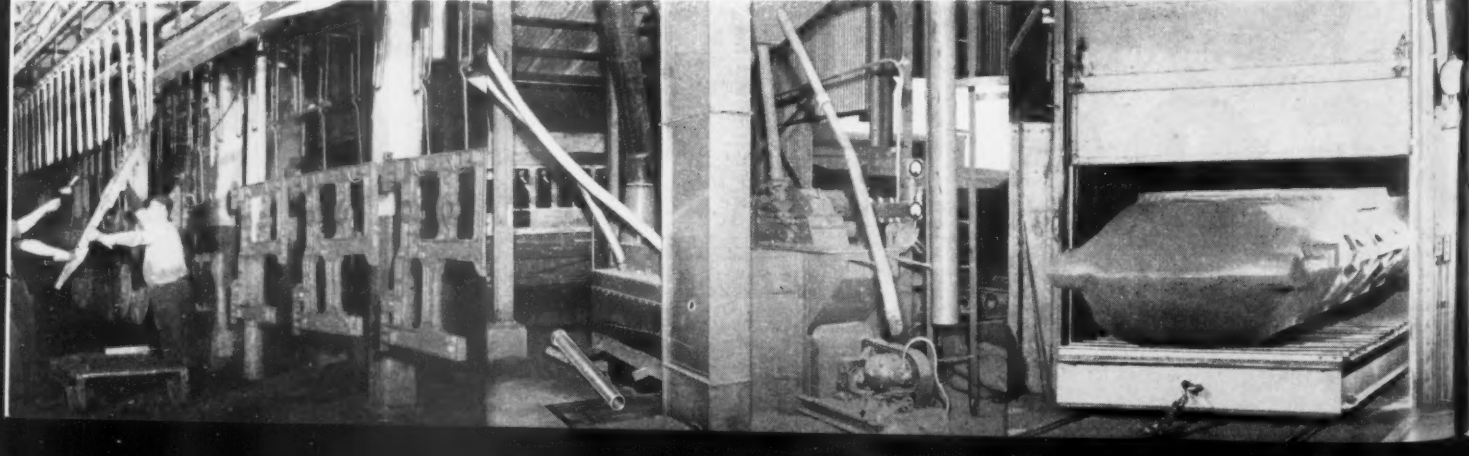


CLEANING TANK CASTINGS at

an Ordnance Plant

How long would it take you to clean a casting as large as this? A conservative estimate for airblasting time would be two men working from 7 to 9 hours each. With a Wheelabrator Room, however, it is being cleaned in just 40 minutes, including all handling time, at a prominent steel foundry. The operator remains outside the room during blasting operations.

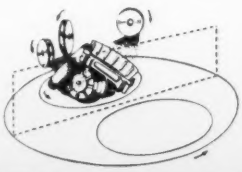




EANING STEEL CASTINGS at

wbrook Steel Castings Co.

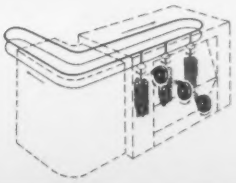
s 72" Wheelabrator Twin Table, installed Sawbrook Steel Castings Co., is effecting direct traceable saving of $41.10 every rking day. It cleans steel castings weigh- from 50 lbs. to 3500 lbs. each. The Twin ble replaced a humane-type airblast table d a large airblast room, both of which volved high cleaning costs, long cleaning riods and constant maintenance expense.



CLEANING CAMSHAFTS at

Campbell, Wyant & Cannon

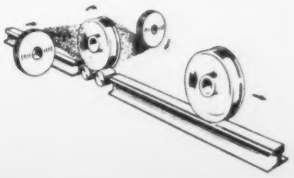
Five high-production Wheelabrator Cabinets are a vital factor in enabling the cleaning department to keep pace with the mass production of automotive castings at Campbell, Wyant & Cannon Foundry Co. Two specially designed Monorail Cabinets—2-pass, indexing, spinner-hanger type—are used for removing sand and scale from cast camshafts. Each cleans more than 1800 pieces hourly.



CLEANING RAILROAD CAR WHEELS at

Southern Wheel Div., American Brake Shoe Corp.

High production, continuous cleaning of railroad car wheels is accomplished in a special Wheelabrator Cabinet at Southern Wheel Division of American Brake Shoe Corp. A rate of 120 wheels hourly is maintained—a 25% production increase over that obtained with their former airblast cabinet. All finishing operations are integrated into one line.



ngproblems solved by wheelabrator®

Pictured are nine "typical" Wheelabrator solutions to foundry cleaning problems. In each "tailor-made" installation a different work-handling method was employed due to the individual production requirements and the nature of the product involved. These examples are only a few of the innumerable "problem-solving" designs that Wheelabrator engineers have been called upon to create in dealing with hundreds upon hundreds of cleaning problems throughout all industry.

This accumulated engineering "know how" coupled with the performance results of the incomparable Wheelabrator is a formidable combination to beat. The record of successful installations speaks for itself. It provides convincing evidence of the wisdom of relying on *American* for the practical solution to your problem.

This 34 page brochure shows the many ways Wheelabrator Cabinets solve cleaning problems for industry. Send today for your copy of Catalog No. 724.

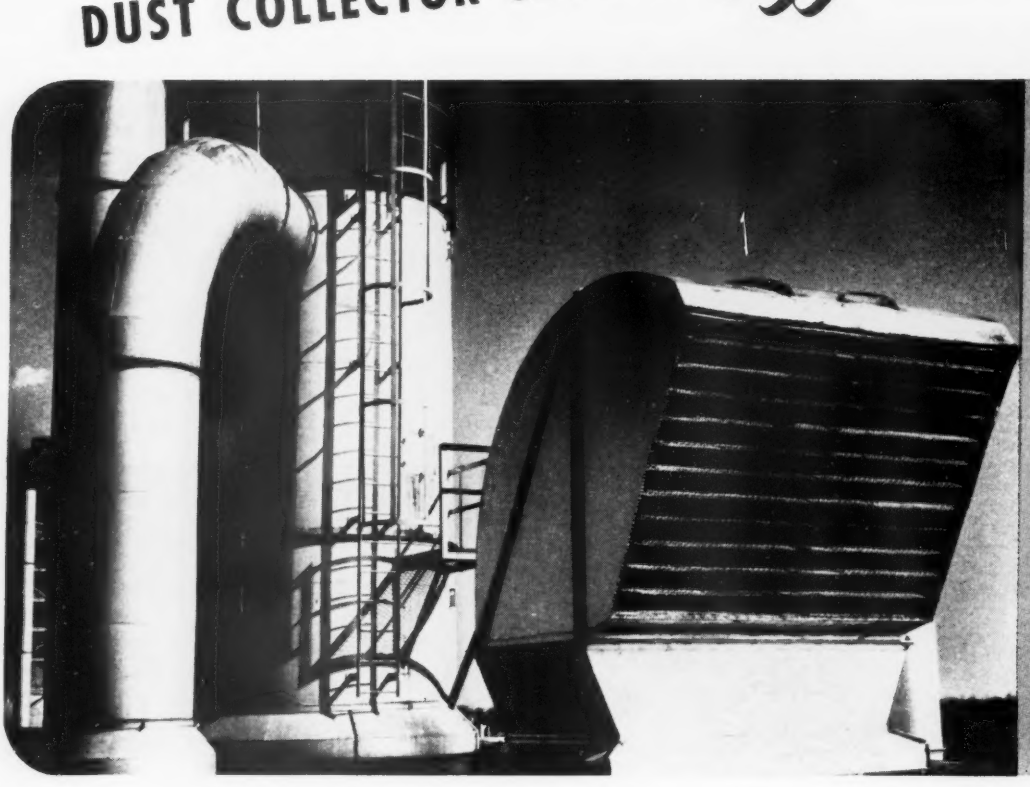
THE AMERICAN MOLDER®

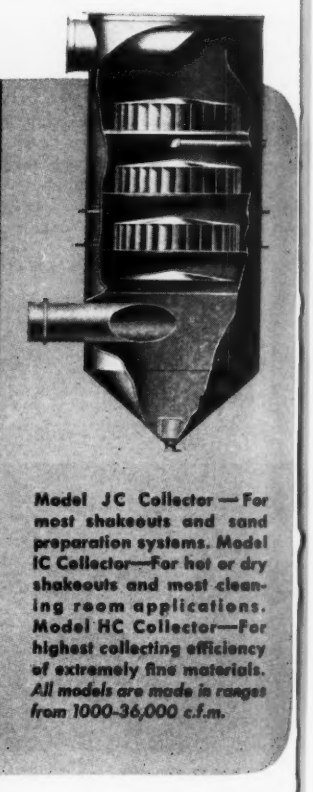
WHEELABRATOR & EQUIPMENT CORP.
505 S. Byrkit St., Mishawaka, Indiana

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

WORLD'S LARGEST BUILDERS OF AIRLESS BLAST EQUIPMENT

INDEPENDENT LABORATORY TESTS FIND MULTI-WASH DUST COLLECTOR SYSTEM 99.9% *Efficient*





Model JC Collector — For most shakeouts and sand preparation systems. Model IC Collector—For hot or dry shakeouts and most cleaning room applications. Model HC Collector—For highest collecting efficiency of extremely fine materials. *All models are made in ranges from 1000-36,000 c.f.m.*

A recent Schneible Multi-Wash installation in a nationally known foundry, has been job-tested by a prominent laboratory. The findings—99.9% efficient on overall normal operation.

This test was conducted to determine the efficiency of dust removal by weight and by count in four particle size ranges, 15 to 30 microns, 5 to 15 microns, 2 to 5 microns and under 2 microns with a type IC Multi-Wash Collector having 4½ impingement stages. During sampling it was handling 33,620 c.f.m. under normal foundry production.

These tests, based on a number of dust particles, showed an efficiency of 99.9%. Based on weight efficiency the percentage was even higher. The chemical analysis was based on dehydrated samples which were so small on the amount remaining from the discharge, that actual silica or other analysis could not be made.

If you are considering any dust collecting system, you can't find a more highly efficient system than Multi-Wash. *Write for your free copy of the complete analysis of the above installation* and *see how you, too, can benefit with Multi-Wash.*

CLAUDE B. SCHNEIBLE CO.

P. O. BOX 81, NORTH END STATION
DETROIT 2, MICHIGAN

Free

Write for your copy today

PRODUCTS:

Multi-Wash Collectors • Uni-Flo Standard Hoods • Uni-Flo Compensating Hoods • Uni-Flo Fractionating Hoods • Water Curtain Cupola Collectors • Ductwork • Velocitrap • Dust Separators • Entrainment Separators • Settling and Dewatering Tanks • "Wear Proof" Centrifugal Slurry Pumps

SCHNEIBLE

Late Foundry News

October 27, 1953

SCRAP EXPORTS PROTESTED: Decision of the government to relax controls over exports of iron and steel scrap has resulted in growing protests from foundries, particularly those on the West Coast. Recent shortages still are fresh in the minds of consumers, some of whom expect to be faced with an immediate boost in cost of scrap to match the export price.

Gray Iron Founders' Society has voiced the disapproval of foundries to Washington, while iron and steel producers, through their industry advisory committee, also expressed their opposition to the liberalized export program at a recent meeting with the Department of Commerce.

The government's new export licensing policy so far has been established for the fourth quarter only. It provides that license applicants must have "accepted orders" from the foreign buyers prior to filing applications. Applications must be accompanied by a statement, executed by a recognized inspection company, certifying as to the grades, location and tonnage of scrap, plus evidence that the material covered is already available to the applicant. Fourth quarter licenses will be valid only until Feb. 28, 1954.

NOW IT'S BDSA: With the demise of the National Production Authority the newly established Business and Defense Services Administration of the Department of Commerce takes over the residual defense and mobilization function of the former NPA. It also establishes 25 industry divisions, staffed by business experts from government and private industry, and provides a focal point for effective co-operation between government and business in promoting economic stability and growth. Ferrous foundries will be represented by a branch of the Iron and Steel Division, while nonferrous foundries come under the Copper Division and Aluminum and Magnesium Division.

FOUNDRY CONSTRUCTION: Three foundries included in the latest lists of companies granted certificates of necessity for rapid tax amortization of new or expanded plant facilities are: Morris Bean & Co., Yellow Springs, O., $310,700; Stevens Mfg. Co., Ebensburg, Pa., $284,822; Paul M. Wiener Foundry Co., Muskegon, Mich., $24,820.

A survey just released by the Bureau of the Census shows that in 1952 foundries spent $118 million on new plants and equipment, of which more than $33 million went for new structures and plant additions. These figures compare with $168 million and $50 million, respectively, in 1951.

FREIGHT RATES CUT: Substantially reduced railroad freight rates on iron and steel products from all points in eastern territory to all points in southern territory have been filed with the Interstate Commerce Commission. The new rates, to become effective on Nov. 21, were established to put eastern shippers on a comparable basis with those who will enjoy similar reductions made by southern railroads. The new southern territory tariffs are expected to take effect Nov. 5.

NICKEL DECONTROLLED: Restrictions over use of nickel have been lifted by the Business and Defense Services Administration. Purchases now may be made from suppliers without government authorization. Concurrent issuance of a new order continues regulation of distribution and use of columbium and columbium-tantalum-bearing steels.

BUREAU OF STANDARDS: The committee of scientists appointed to study operations of the National Bureau of Standards stressed in its recent report the need for increased emphasis on basic programs. The decrease in such work since 1950 the committee termed as "tragic." Other recommendations were: Transfer of weaponry projects to the Department of Defense; division of the primary responsibility for policy and procedure on commercial product tests between the Secretary of Commerce and the bureau's director; and establishment of advisory groups to the director selected from eight scientific and technical societies.

PERSONALS: Kenneth M. Smith is returning to National Malleable & Steel Castings Co., Cleveland, after serving more than seven months as chief of the Castings Section in the NPA Iron and Steel Division. He is to be succeeded as head of the new Castings Branch by Bradley B. Evans, Empire Steel Castings Inc., Reading, Pa. . . . Lothair Teetor, board chairman of the Perfect Circle Corp., Hagerstown, Ind., has been appointed special consultant to the secretary, U. S. Department of Commerce . . . Col. Willard F. Rockwell has resigned as assistant to Secretary of Defense Charles

E. Wilson to return to the board chairmanship of Rockwell Mfg. Co., Pittsburgh . . . Perrin G. March III, president, Cincinnati Shaper Co., has been appointed an assistant administrator of the Business and Defense Services Administration. New assistant deputy administrator of BDSA is William E. Haines, formerly with Hercules Powder Co., Wilmington, Del., and Millville Mfg. Co., Millville, N. J., while Charles F. Honeywell, recently senior special assistant to Commerce Secretary Weeks, has been appointed administrator.

PRODUCTION POOL: Another "small business" defense production pool, organized by the former Small Defense Plants Administration and now approved by the attorney general, includes a foundry. The pool is Federated Facilities Inc., Minneapolis, made up of Walter Haertel Co., Minneapolis, Kausel Foundry Co., Minneapolis, Presto Mfg. Co., Inc., St. Paul, and Superior Plating Inc., Minneapolis.

LAVIN EXPANDS: R. Lavin & Sons Inc., 55-year-old Chicago refiner of nonferrous metals, has absorbed L. A. Cohn & Bro. Inc. of the same city. The purchase includes all inventory and physical effects in the Cohn plant but not the real estate. Lavin will continue to operate its expanded Chicago and North Chicago plants, and is also negotiating for a plant in the East. Its officers are: President, William Lavin; vice presidents, Morris Isaacson and Norman Lavin; secretary-treasurer, Benjamin Lavin.

MISCELLANY: Freight car builders had a backlog of 42,198 cars on Oct. 1, compared with 80,296 on Jan. 1. Deliveries totaled 5706 and orders 3914 units in September . . . Consumers' stocks of pig iron on Sept. 1 were 2,114,000 tons, an all-time high, according to the Bureau of Mines . . . Foundries accounted for 23 per cent (322,746 tons) of all bentonite consumed in 1952, an increase of 14 per cent compared with 1951. All records for bentonite production were broken last year, the Bureau of Mines reports . . . September expenditures of $3.3 billion for new construction were 5 per cent ahead of the like 1952 month. The nine-months' total was 7 per cent larger than a year ago, government figures show.

PRICES OF FOUNDRY METALS AND COKE

(As of Oct. 27, 1953)

FOUNDRY COKE

(Per net ton, f.o.b. ovens)

BEEHIVE

Connellsville	$16.50-17.00

OVEN

Birmingham	$22.65
Chicago	24.50
Detroit	25.50
Erie, Pa.	25.00
Everett, Mass.	26.00
Indianapolis	24.25
Kearney, N. J.	24.00
Milwaukee	25.25
New Haven, Conn.	23.45
Painesville, O.	25.50
Philadelphia	23.95
Portsmouth, O.	24.00
St. Louis	26.00
St. Paul	23.75
Swedeland, Pa.	23.85
Terre Haute, Ind.	24.05

PIG IRON

(Per gross ton f.o.b. furnace)

	No. 2 Foundry	Malleable
Bethlehem, Pa.	$58.50	$59.00
Birmingham	52.88	....
Buffalo	56.50	57.00
Chicago	56.50	56.50
Cleveland	56.50	56.50
Everett, Mass.	63.25	63.75
Fontana, Calif.	62.50	....
Geneva, Utah	58.00	....
Granite City, Ill.	58.40	58.90
Lone Star, Tex.	52.50	52.50
Neville Island (Pittsburgh)	56.50	56.50
Steelton, Pa.	58.50	59.00
Swedeland, Pa.	58.50	59.00
Toledo, O.	56.50	56.50
Troy, N. Y.	58.50	59.00
Youngstown, O.	56.50	56.50

NONFERROUS INGOT

BRASS AND BRONZE: Red brass, No. 115, 24.50; tin bronze, No. 225, 35.25, No. 245, 29.50; high-leaded tin bronze, No. 305, 28.75; No. 1 yellow, No. 405, 20.75; manganese bronze No. 421, 25.25.

ALUMINUM: 99 per cent plus, primary ingots 21.50c. Secondary No. 12 alloy 19.50-20.50. Deoxidizing grades: No. 1 20.50-21.00; No. 4 17.00-18.00c.

MAGNESIUM: 99.8 per cent standard ingots 27.00c, f.o.b. Freeport, Tex.

COPPER: Electrolytic 29.50-30.00c, Connecticut valley.

ZINC: High grade 11.35c, delivered. Die casting alloy 14.50c, delivered.

IRON AND STEEL SCRAP

(Consumer prices per gross ton delivered, except as otherwise noted)

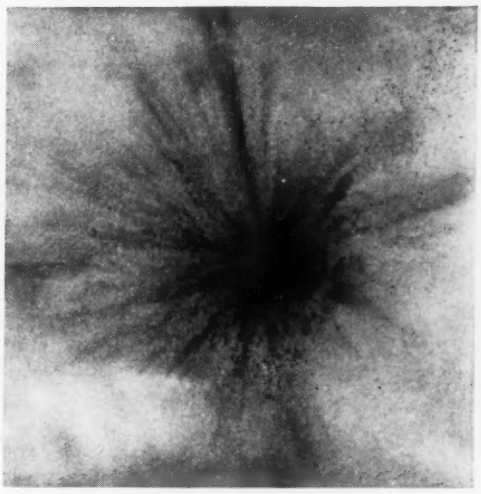
	No. 1 Heavy Melting Steel	No. 1 Cupola Cast	Heavy Breakable Cast	Clean Auto Cast	Machinery Cast	Malleable	Short Steel Rails
Birmingham	$26.00-26.50	**$41.00-42.50	**$30.00-31.00	.....	.....	.....	$42.00-43.00
Boston*	**25.00-26.00	**29.00-30.00	.....	.....	**36.00-37.00	.....	.....
Buffalo	34.00-35.00	**33.00-34.00	.....	.....	**39.00-40.00	.....	46.00-47.00
Chicago	30.00-31.00	32.00-33.00	.....	36.00-37.00	36.00-37.00	40.00-41.00	45.00-48.00
Cincinnati*	**31.00-32.00	**42.00	**35.00	.....	**46.00	**42.00-43.00	**48.00-49.00
Cleveland	31.00-32.00	39.00-40.00	26.00-27.00	45.00-46.00	45.00-46.00	45.00-46.00	49.00-51.00
Detroit*	**26.00	**40.00	**29.00-30.00	**40.00	.....	**40.00	.....
Los Angeles	23.00	**37.00-40.00	.....	.....	.....	.....	.....
New York*	27.00-28.00	29.00-30.00	.....	.....	.....	.....	.....
Philadelphia	31.00-32.00	35.00-36.00	38.50	.....	40.00-41.00	.....	.....
Pittsburgh	36.00-37.00	39.00-40.00	36.00-37.00	.....	46.00-47.00	.....	50.00-52.00
St. Louis*	29.00-30.00	36.00-37.00	29.00-30.00	37.00-39.00	.....	37.00-38.00	44.00-45.00
San Francisco	23.00	39.00	36.00	39.00	43.00	.....	.....
Seattle	29.00	**30.00-35.00	**25.00-30.00	.....	.....	.....	.....

*Brokers' buying prices. **F.o.b. shipping point.

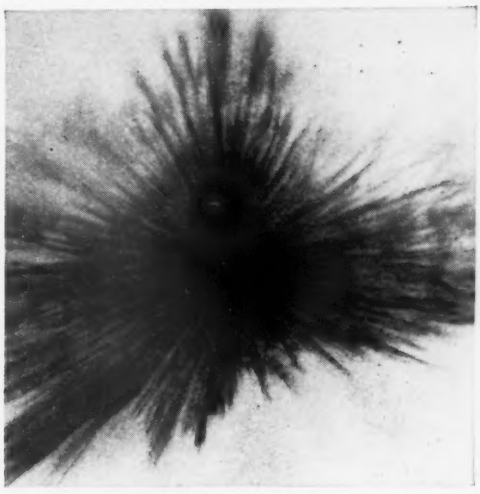
Make Your Foundry A Better Place To Work With The

HYGEIA TWINS

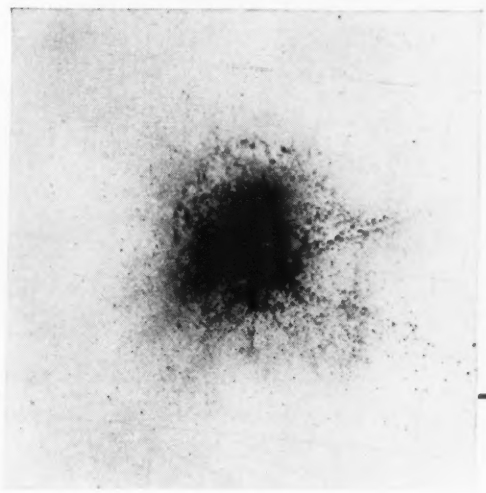
HYGEIA PITCH AND HYGEIA SEACOAL



Drop Test Scatter Pattern
of Regular Grind Pitch

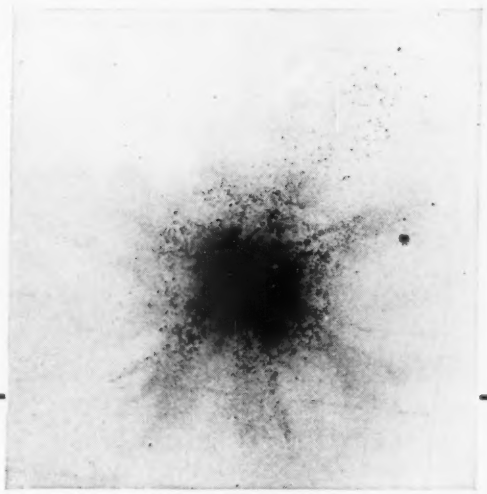


Drop Test Scatter Pattern
of Regular Grind Seacoal



Drop Test Scatter Pattern
of Regular Grind *Hygeia* Pitch

Dust count using impinger method showed *400* particles of regular pitch were airborne to *1* of hygeia pitch



Drop Test Scatter Pattern
of Regular Grind *Hygeia* Seacoal

Dust count using impinger method showed *800* particles of regular seacoal were airborne to *1* of hygeia seacoal

SOME POSITIVE ADVANTAGES

1—Permanently dust-free
2—Cleaner handling
3—Less material lost
4—Minimizes fire hazard
5—Improved flowability
6—Safer working conditions
7—Blends easier with sand
8—Better shakeout
9—More economical
10—Cleaner Foundry

You owe it to yourself to investigate our claims. Write for further details.

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A product for EVERY

• Your Widest Choice of Abrasives for Every Operation

PRODUCTS	SNAGGING or ROUGH GRINDING	DEBURRING	WELD GRINDING	SMOOTHING EDGES	FINISHING and POLISHING	DIE GRINDING
Straight Wheels	✓		✓		✓	✓
Rubber Bushed Straight Wheels	✓		✓			
Mounted Wheels		✓	✓	✓		✓
Cup Wheels	✓		✓			
"MX" Straight Wheels	✓	✓	✓		✓	✓
"MX" Mounted Wheels		✓		✓	✓	✓
"MX" Discs and Depressed Center Wheels	✓	✓	✓	✓	✓	
Coated Abrasive Discs		✓	✓	✓	✓	✓
Coated Abrasive Bands and Sleeves		✓		✓	✓	✓
Cartridge Rolls		✓		✓		✓
Coated Abrasive Belts with "Port-A-Belt" Grinding Attachment	✓		✓		✓	✓

...from CARBO

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"Carborundum," "MX" and "Port-A-Belt" are trademarks of The Carborundum Company, Niagara Falls, N. Y.

PORTABLE GRINDING job

Deburring with slotted discs. You can choose the deburring method best for you from at least 7 abrasive products by CARBORUNDUM.

Weld clean-up with rubber-bushed straight wheel by CARBORUNDUM...one of 8 ways you can grind welds with portable equipment.

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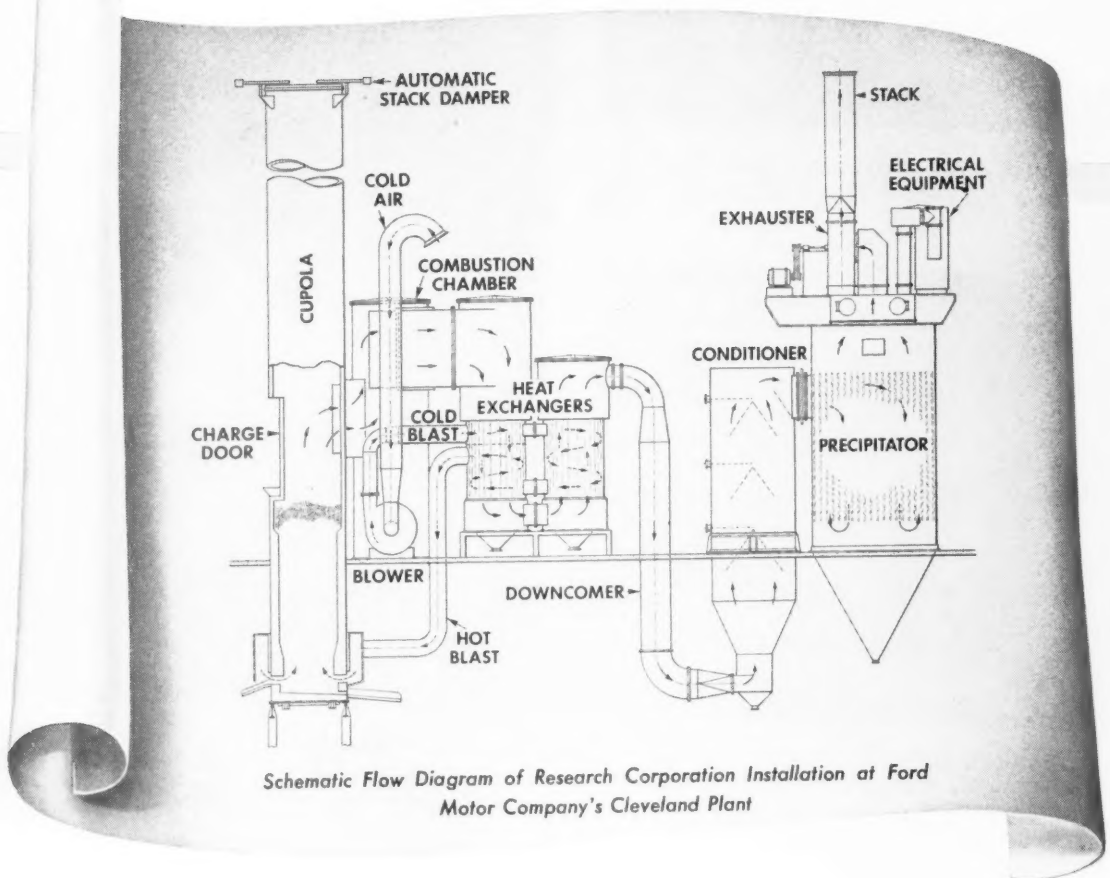
91-39

NEW CUPOLA PRECIPITATORS

assure clean stacks at Ford



Schematic Flow Diagram of Research Corporation Installation at Ford Motor Company's Cleveland Plant

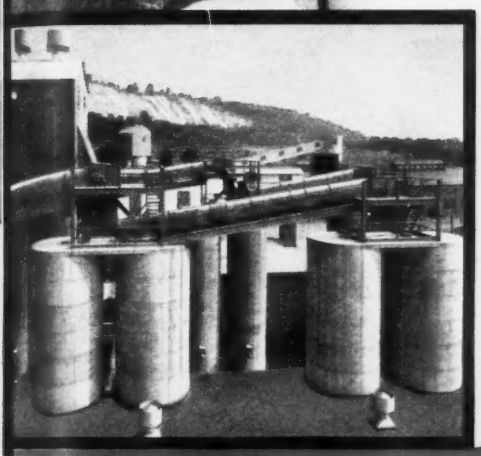
The schematic diagram above shows how one of the five Cottrell Precipitators removes suspended dust from the gases originating in ten iron ore cupolas. These Research Corporation units consist of (A) a water spray conditioning and cooling chamber, (B) a vertical flow precipitator with the patented MI Rapper, which eliminates rapping puffs, and (C) an induced draft fan.

If your cupola stack gases are a problem, contact your Research Corporation Engineer. He will give you the benefit of development and pilot plant experience as well as recommendations based on results of commercial installations.

RESEARCH CORPORATION

405 Lexington Avenue, New York 17, N. Y.
Bound Brook, N. J. • Grant Building, Pittsburgh 19, Pa.
122 South Michigan Avenue, Chicago 3, Illinois

RC 142



HUGE STORAGE FACILITIES INSURE IMMEDIATE SHIPMENT

Make better... smoother castings

without sacrificing permeability

Use PENN SAND —a "natural" for your foundry

You can get better finish and higher permeability with the same sand—PENN SAND. Unique grain structure and distribution give PENN SAND built-in lower density, which in turn results in both lower confined expansion and higher permeability. These inherent advantages save you time and money by reducing rat tails, veining, scabbing, buckles and other defects.

Join the increasing number of foundrymen who are benefiting by the advantages that make PENN SAND a natural for the foundry industry. Washed, dried and screened grades for steel, gray iron, malleable, brass, bronze, aluminum and magnesium castings.

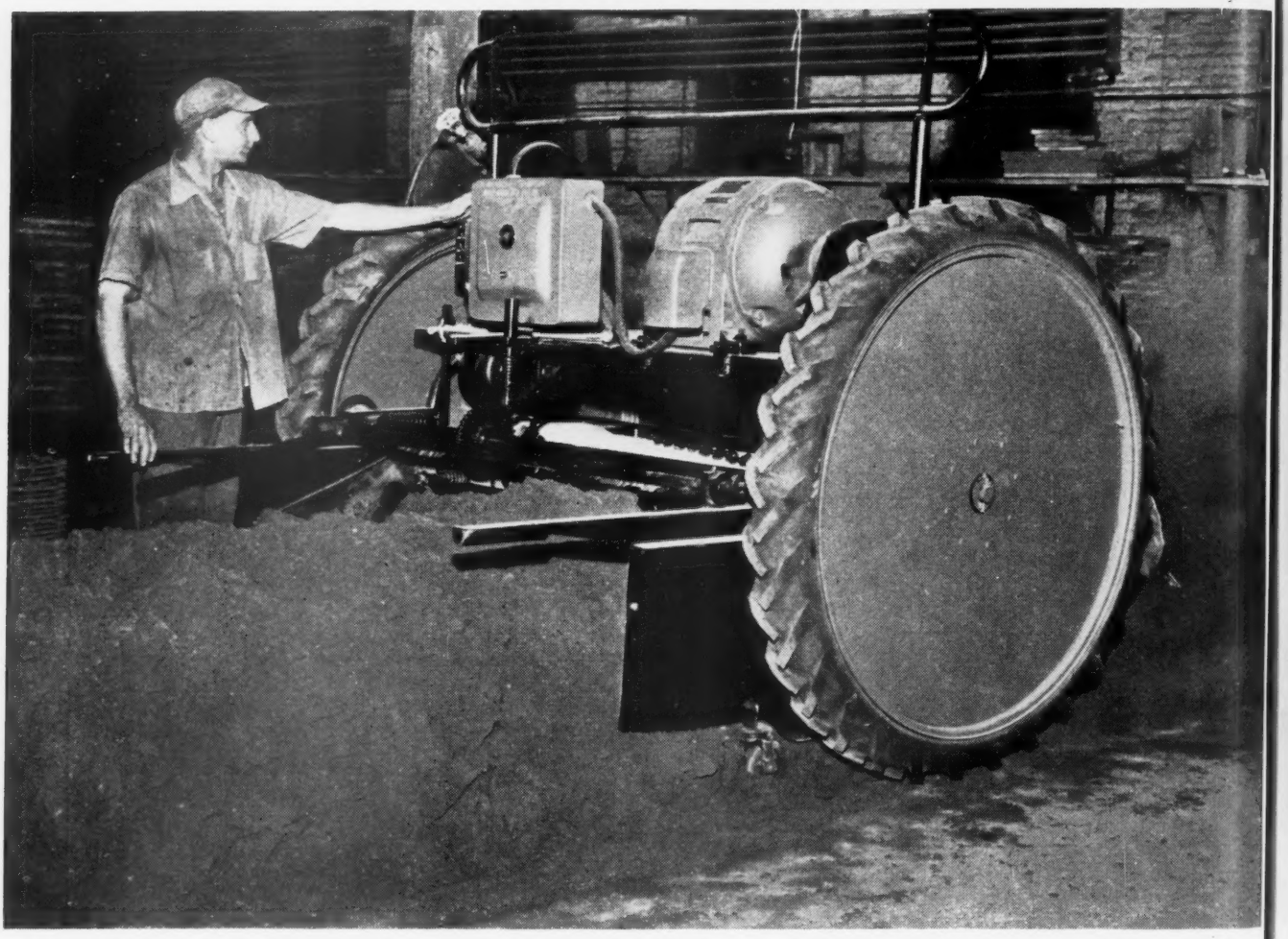
• Write today for further information and free samples

PENNSYLVANIA GLASS SAND CORP.

General Sales Offices: Gateway Center, Pittsburgh 22, Pennsylvania — Eastern Sales Office: Trenton Trust Building, Trenton 8, New Jersey

MOLDING SAND · CORE SAND · SHELL-MOLDING SAND · SANDBLAST SAND · SILICA FLOUR

The New Moulders' Friend
FINDS FRIENDS EVERYWHERE



MOULDERS like The New Moulders' Friend sand conditioner, because the blending action of the rotary wire brush thoroughly mixes and aerates the sand, making it easier to put up more and better molds.

NIGHT CREWS like it, because it eliminates much manual labor and does a better job of conditioning the sand. With this completely self-propelled machine one man can condition more than two tons of sand per minute.

SAND CONTROL MEN like it, because it does such a thorough job of mixing, moistening and screening that they really can control the sand.

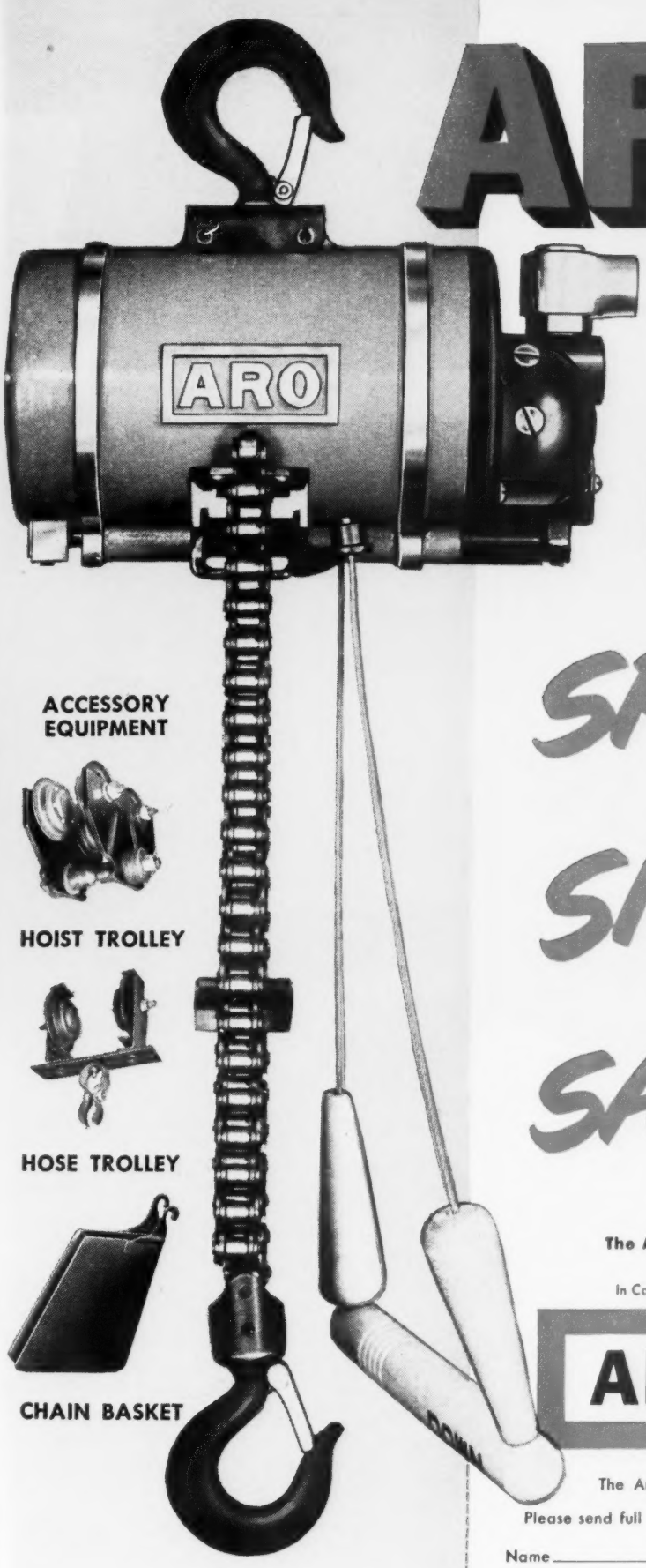
MAINTENANCE MEN like it, because it has few moving parts to keep in order.

YOU will like The New Moulders' Friend, because it pays for itself quickly with better castings and labor saved.

Investigate The Moulders' Friend today. See one in operation.

"The Moulders' Friend" — — **Dallas City, Illinois**

ARO



ACCESSORY EQUIPMENT

HOIST TROLLEY

HOSE TROLLEY

CHAIN BASKET

1000 pound AIR HOIST

for

SPEED...

Lift rate... over 40 ft. per minute!

SIZE...

Overall length 10¼" weighs only 28½ lbs.

SAFETY...

Betters all safety requirements!

The Aro Equipment Corporation, Bryan, Ohio

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ARO AIR HOIST

Also . . . Air Tools . . . Lubricating Equipment . . . Aircraft Products . . . Grease Fittings

The Aro Equipment Corporation, Bryan, Ohio

Please send full details on the new ARO Air Hoist, without obligation.

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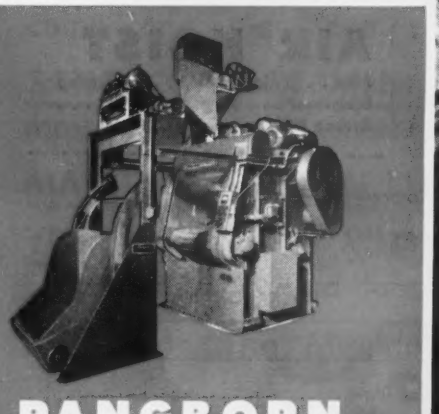

PANGBORN
BLASTMASTER BARREL

Looking into the Blastmaster Barrel at Detroit Harvester. Abrasive-tight door has been opened for easy unloading. Note gleaming finish of cleaned pieces.

PANGBORN

BLASTMASTER BARREL

Cuts Cleaning Time 56%

And gives "finest finish" to the work for Henry and Allen Division of Detroit Harvester Co., Auburn, N. Y.

Formerly, the cleaning operation at Detroit Harvester required 44½ hours a week. Now a Pangborn Blastmaster handles all blast cleaning requirements in only 20 hours a week! So cleaning time has been cut 56%. In addition, labor costs have been reduced and experienced men are released for other work. Superintendent F. C. Palmer reports, *"We are highly pleased with the new Pangborn Barrel. It is very fast and thorough . . . saves money by cutting our blast cleaning job to less than half."*

102 Sold in 10 months

Quality? Here's what Assistant Foreman Mike Hulik (with the company since 1912) has to say: *"This new Pangborn machine gives us the finest finish I have ever seen."*

The Blastmaster at Detroit Harvester is not an unusual installation. Blastmasters all over the country are winning commendations for fast, cost-cutting, *quality* performance on ferrous, non-ferrous and other metal castings. If *you* are interested in better, cheaper cleaning, investigate the Pangborn Blastmaster Barrel. Available in 4 sizes—3, 6, 12, or 18 cu. ft. capacities. For more details, write for Bulletin 223 to: PANGBORN CORP., 1400 Pangborn Blvd., Hagerstown, Md.

OVER 28,000 PANGBORN MACHINES SERVING INDUSTRY

Look to Pangborn for the latest developments in Blast Cleaning and Dust Control equipment.

Pangborn

BLAST CLEANS CHEAPER
with the right equipment for every job

AIR

can be just as important to you!

The higher a jet flies . . . the thinner the atmosphere and the more important the pilot's air supply. If his air supply runs out . . . he "blacks out"!

Perhaps your plant's air supply . . . prime mover in dust and fume collection . . . is getting dangerously "thin". Rearrangement or addition of equiment, "temporary" piping or other factors may have slashed the efficiency of your collecting systems. Dust and fumes "out of control" run up costs, may affect employee morale and plant-community relations.

If you need new systems or more capacity in existing systems, consult Kirk & Blum, experts with 46 years of experience in the application of "clean air . . . the invisible tool". This organization of engineers and mechanics assumes complete responsibility for design, fabrication and erection. For complete information write: The Kirk & Blum Mfg. Co., 3108 Forrer St., Cincinnati 9, Ohio.

FOR CLEAN AIR . . . THE INVISIBLE TOOL

KIRK AND BLUM

DUST AND FUME CONTROL

Answers to Shakeout Problems

How to Select the Right Unit . . . Decide for yourself. The new bulletin (illustrated at right) shows how to choose the best unit for the job, how to decide on deck openings, layout, motor, etc.

How to Reduce Installation Costs . . . You can avoid heavy, massive foundations. Installation of a *Foundromatic* shakeout is easy. Low headroom requirement allows plenty of room for sand removal system.

How to Cut Maintenance . . . Simplified *Foundromatic* shakeout design has fewer parts. Construction is unusually rugged. Less time is required for shaking out.

Get your copy of this helpful bulletin. Ask your nearby Allis-Chalmers office. Or write Allis-Chalmers, Milwaukee 1, Wisconsin, for "*Foundromatic* Shakeouts," Bulletin 07B6365B. A-4163

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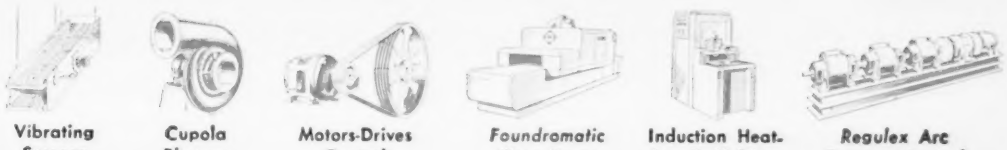
ALLIS-CHALMERS

A-C ALLIS-CHALMERS

Foundry Equipment for Bigger Output—Better Working Conditions!



Vibrating Screens | Cupola Blowers | Motors-Drives Control | *Foundromatic* Core Dryer | Induction Heating & Melting | *Regulex* Arc Furnace Control

Here's your Rx for longer metal-melting runs...

Up to 64 Hours Continuous Service! In foundries everywhere, Norton CRYSTOLON* slag hole blocks are chalking up new records for operation without shutdown.

Norton slag hole blocks

Extra long service life . . . no softening or spalling at temperatures up to 3050°F . . . 5 to 15 times greater resistance to corrosion and erosion than you could ever get with fire clay blocks!

That's your Rx — another Norton "special refractory prescription" — for increasing production and cutting the time and trouble of your metal melting operations.

Fill that Rx by standardizing on Norton slag hole blocks. Made of CRYSTOLON refractory material — extremely dense to resist slag penetration and chemical attack — they'll give you the longest, most dependable service you can get, reducing your maintenance and replacement costs to new, profit-boosting lows!

CRYSTOLON slag hole blocks are made in shapes to meet every foundry requirement. See your Norton Representative for complete facts. Or write to NORTON COMPANY, 310 New Bond Street, Worcester 6, Mass. *Canadian Representative:* A. P. Green Fire Brick Co., Ltd., Toronto, Ontario.

*Trade-Mark Reg. U. S. Pat. Off. and Foreign Countries

NORTON

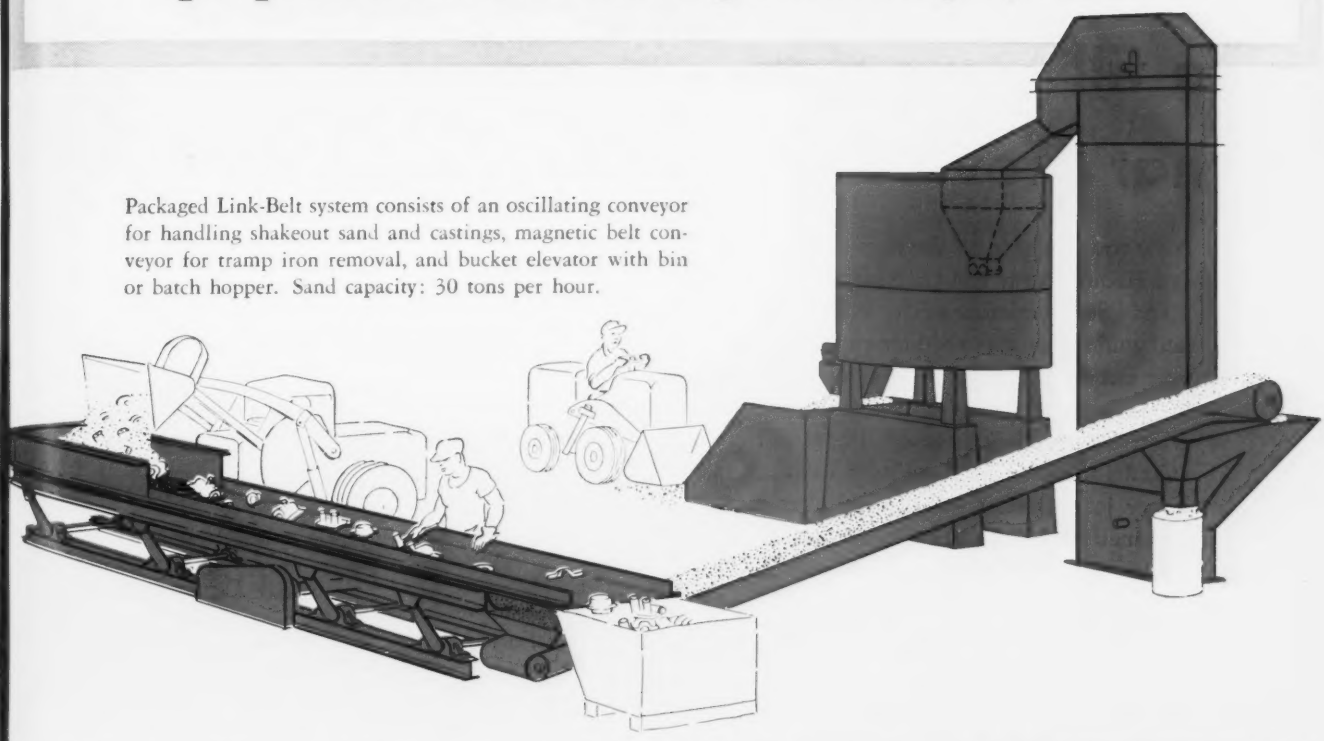
Special REFRACTORIES

Making better products... to make other products better

NORTON COMPANY, WORCESTER 6, MASSACHUSETTS

Now small foundries cut costs

with pre-engineered, packaged sand preparation and casting handling system



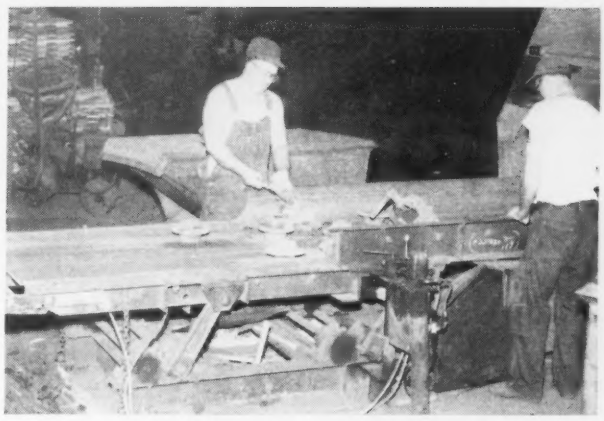
Packaged Link-Belt system consists of an oscillating conveyor for handling shakeout sand and castings, magnetic belt conveyor for tramp iron removal, and bucket elevator with bin or batch hopper. Sand capacity: 30 tons per hour.

LINK-BELT combines ruggedness, compactness and low cost in a modern, mechanized unit

IF you have less than 100 employees in your foundry, here's the ideal answer for increased output of better castings . . . at lower cost. Link-Belt has applied its broad experience in foundry handling problems to produce a compact, pre-engineered system that revolutionizes small foundry casting operations. It means "big foundry" organization and efficiency, regardless of the volume of your production.

Through modern sand control, this unit will quickly pay its way by reducing labor costs and improving casting quality. Equally important, systematic handling of sand and castings assures better working conditions and a cleaner foundry . . . eliminates wasted floor space.

Whether your foundry is large or small—gray iron, steel, malleable or non-ferrous—Link-Belt engineering and equipment fill the bill. A foundry specialist will be glad to work with you or your consultant. Your nearest Link-Belt office welcomes the opportunity to give you complete information.



Link-Belt Oscillating Conveyor has perforated trough at feed end to act as shakeout section and plain section of trough for spruing and sorting of castings. Air cylinder operates damming gate between sections to hold back castings for proper shakeout action.

13,278

LINK-BELT

CONVEYORS AND PREPARATION MACHINERY

LINK-BELT COMPANY: Plants: Chicago, Indianapolis, Philadelphia, Colmar, Pa., Atlanta, Houston, Minneapolis, San Francisco, Los Angeles, Seattle; Scarboro, Toronto and Elmira, Ont. (Canada); Springs (South Africa); Sydney (Australia). Sales Offices in Principal Cities.

NOW Handy Sandy

to fill large flasks in seconds - that previously took several man hours

Now you can have all the cost-cutting advantages of the standard Handy Sandy for your larger size molds. The new Super Handy Sandy eliminates shoveling from molding on these jobs and multiplies the productivity of men and machines. This unit can handle up to 50 tons of sand per hour into the overhead hoppers where it is available to the molders without effort. Super Handy Sandy's big sand capacity makes it ideally suited for use with the bigger molding machines such as the heavy jolt squeeze pinlifts, rollover machines, bumpers, and automatic molding machines now being developed. Its use drastically reduces molding time on floor operations.

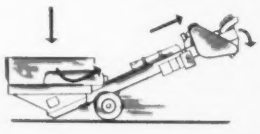
The savings possible through use of the Super Handy Sandy are almost unbelievable. In one test installation, mold production on large molds has been increased 150% due to savings in shovel time alone. With the Super Handy Sandy, one molder can fill more molds than several men with shovels. He merely operates an air valve and the sand falls into the flask. Thus he spends more time making molds and less time getting ready.

The Super Handy Sandy is a low-cost, individual-floor sand handling unit and incorporates an aerator at point of final discharge to molder's bins. It is available with single or double hoppers for supplying one or two molding stations. Two single hopper units can be installed with a common feed hopper when desired.

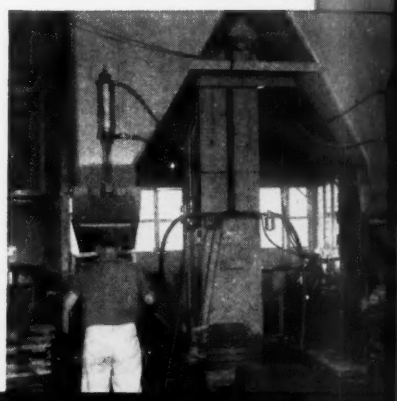
STANDARD HANDY SANDY

puts the sand pile overhead to eliminate shoveling for the molder.

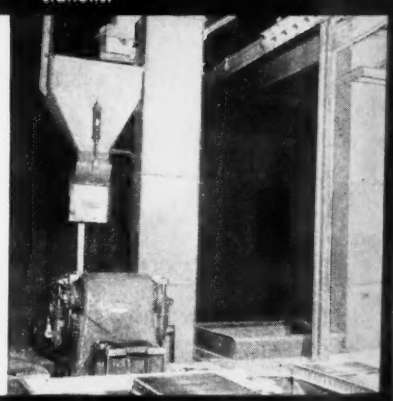
STANDARD REDDY SANDY



takes the hard work out of shake-out and sand preparation.



Close-up view of a Super Handy Sandy Twin Hoppers for supplying two me stations.



Two Single Hopper Super Handy Sandy a common feed hopper supplying both

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NEWAYGO ENGINEERING COMPANY

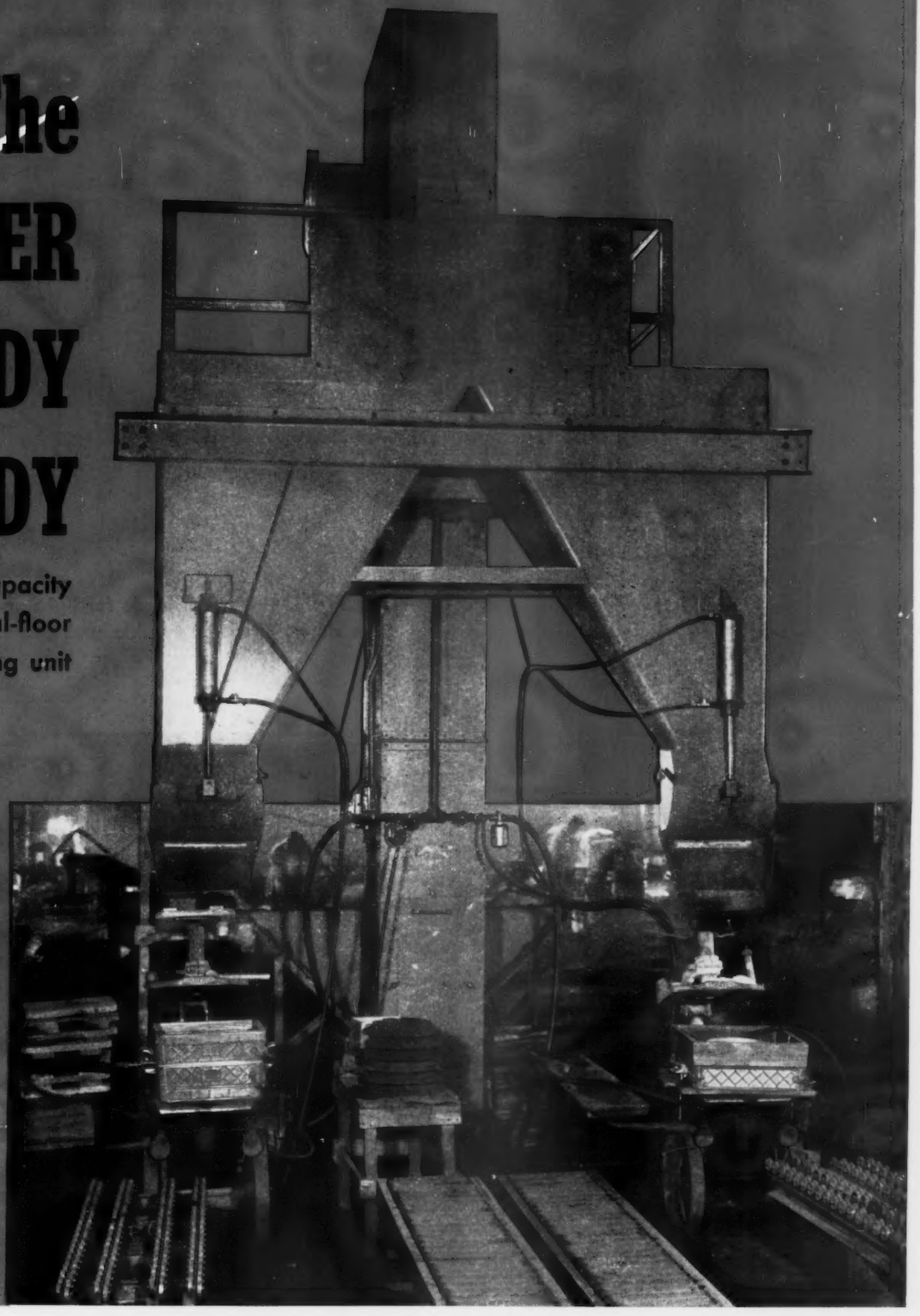
Newaygo, Michigan

Manufacturers of Neway® Mold Handling, Sand Handling and Conditioning

has a Big Brother!

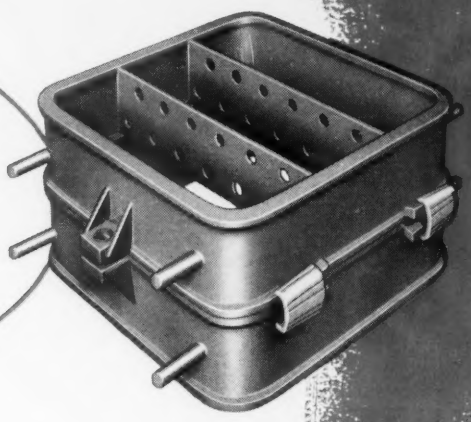
The SUPER HANDY SANDY

a high capacity individual-floor sand handling unit

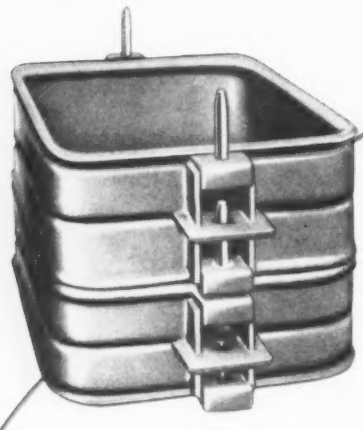


EATON RAPIDS 2851

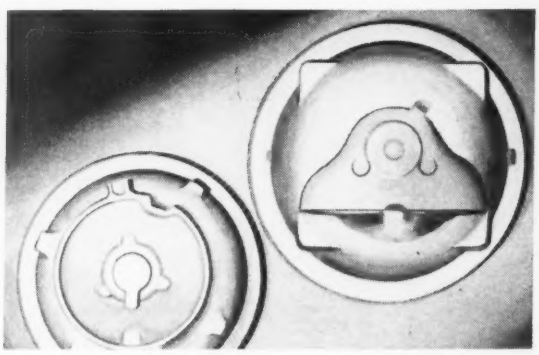
Jot it down on your memo pad . . . memorize it . . . or simply reach for your phone and call it. It's your key to a ready source for quality flasks and plastic patterns or match plates.



Industrial Fabricated flasks are normalized and stress relieved before machining to reduce your maintenance cost.



PRESTEEL flasks are made for light and medium duty. Accurate, durable and economical.



Patterns and match plates made from casting resins and laminates are available to you at considerable savings in time and cost.

Ask for catalog material or for one of our representatives to call.

remember that number

INDUSTRIAL AND FOUNDRY SALES INC.

TELEPHONE 2851

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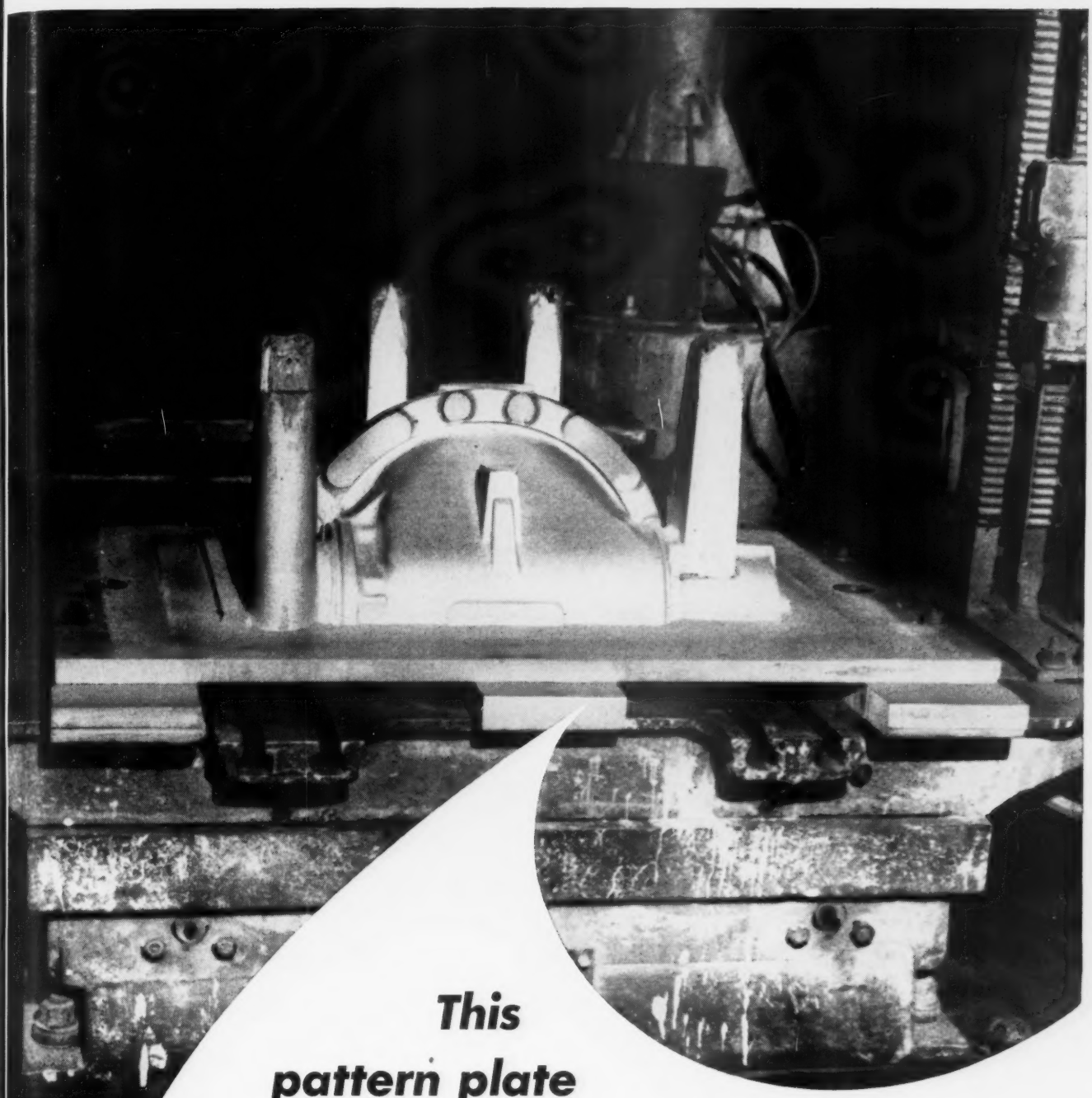


This pattern plate is aluminum

(Alcoa Aluminum Tool & Jig Plate) because aluminum is light—easy to handle. It also costs substantially less than if it were made of steel because material costs are lower and machining is faster.

Alcoa casts Tool & Jig Plate in thicknesses from ⅜″ to 4″—and in dimensions up to 48″ x 96″. It is normalized and available from stock . . . machined on both sides. For full information on Alcoa Tool & Jig Plate, contact your local Alcoa sales office . . . or write Aluminum Company of America, 1949-L Alcoa Building, Pittsburgh 19, Pa.

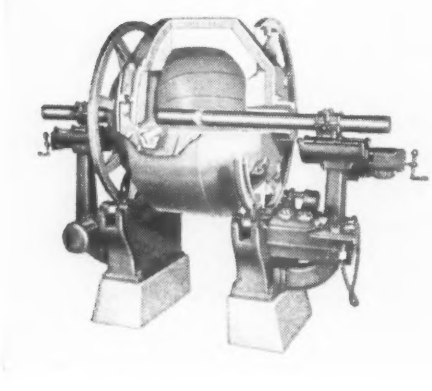
Alcoa Aluminum

ALUMINUM COMPANY OF AMERICA

13 DETROIT ROCKING ELECTRIC FURNACES

. . . with 11,000 lbs. capacity

MELT BRASS AT C



Cutaway view of Detroit Rocking Electric Furnace, showing engineering and construction features.

The first Detroit Furnace was chosen for the Crane Co. production team in 1924. It has been joined, over a 29-year period, by twelve more Detroit Rocking Electric Furnaces. The thirteen, having a combined capacity of 11,050 lbs., melt tons of brass required in daily production of the many Crane products cast in brass, bronze and Monel.

Detroit Rocking Electric Furnaces are producing high quality melts of ferrous and nonferrous metals in hundreds of foundries, making products of all kinds. Service records of twenty and more years for these furnaces are not at ail uncommon.

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Four Type AA, 250 Kw., 1500 lb. capacity Detroit Furnaces at Crane Co. There are nine other Detroit Furnaces in use by this company

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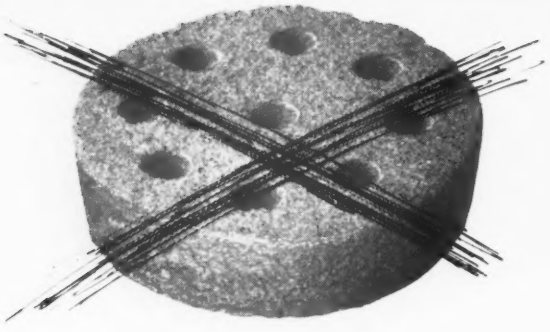

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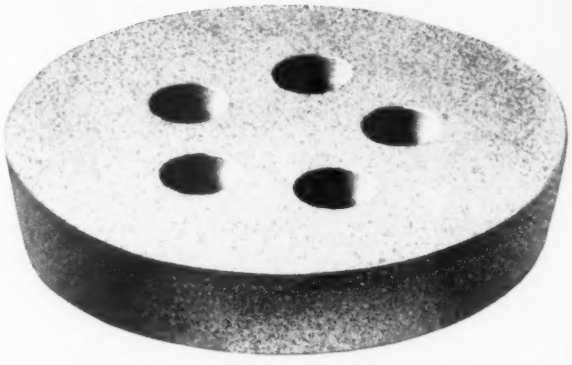

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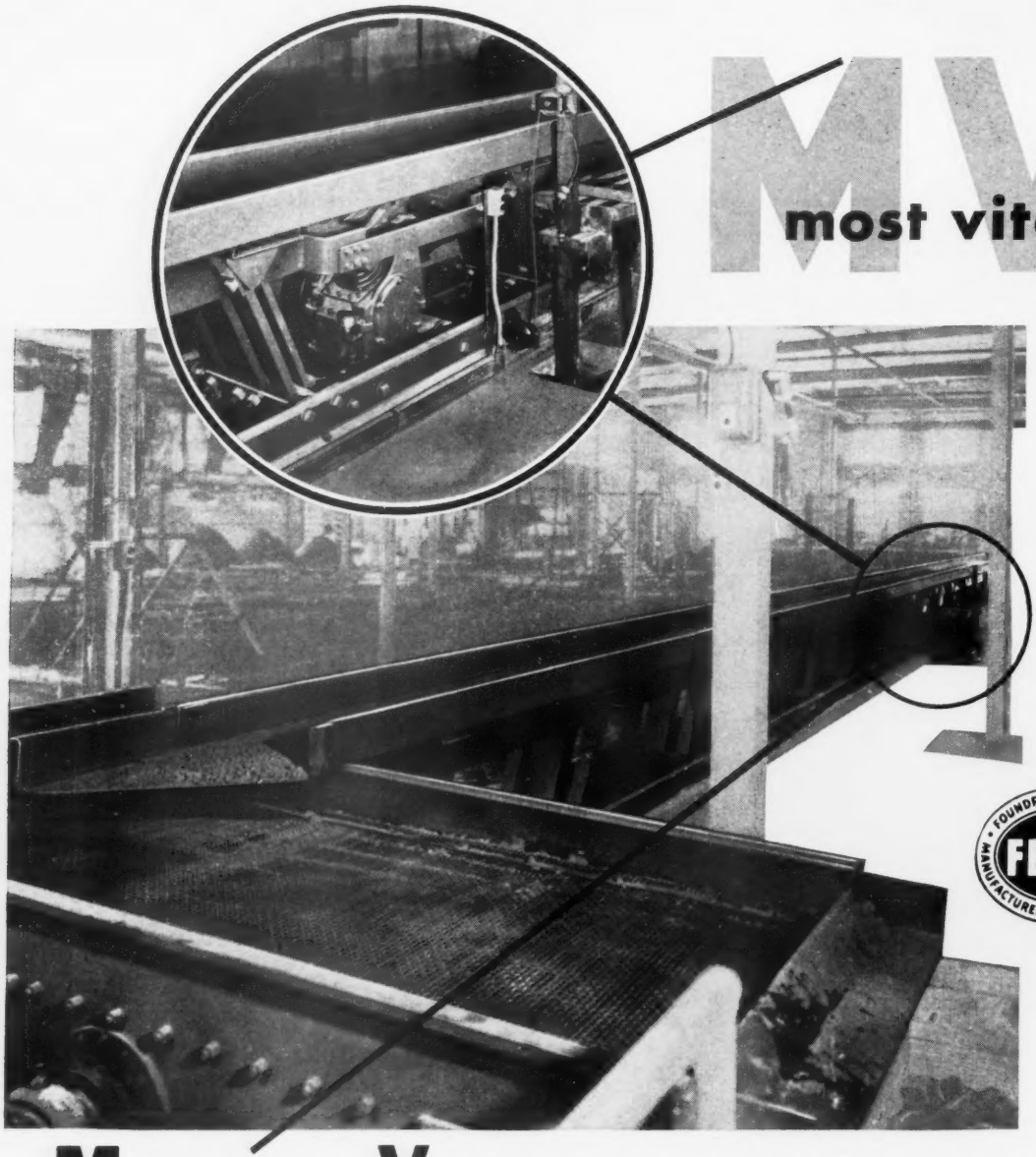

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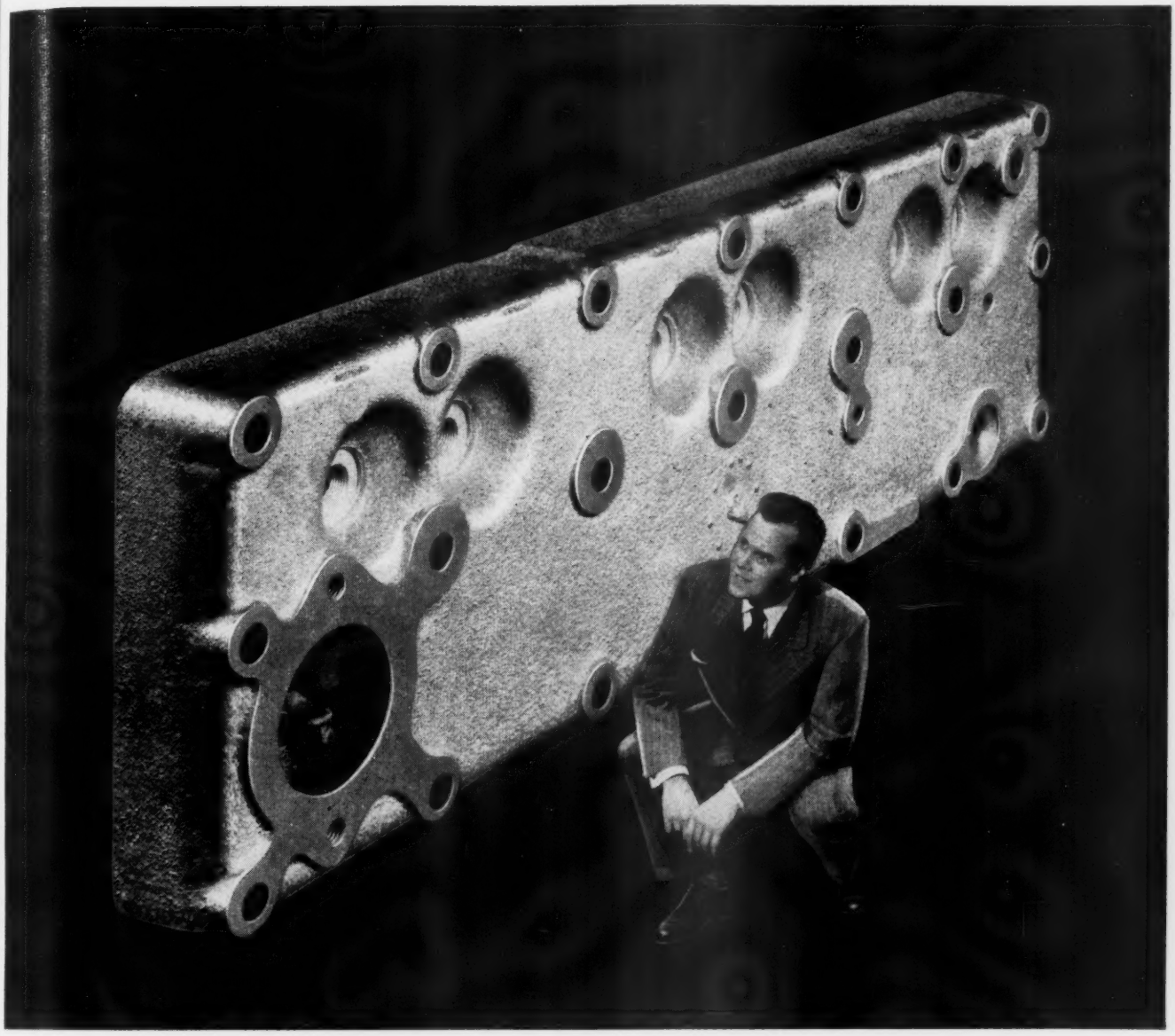

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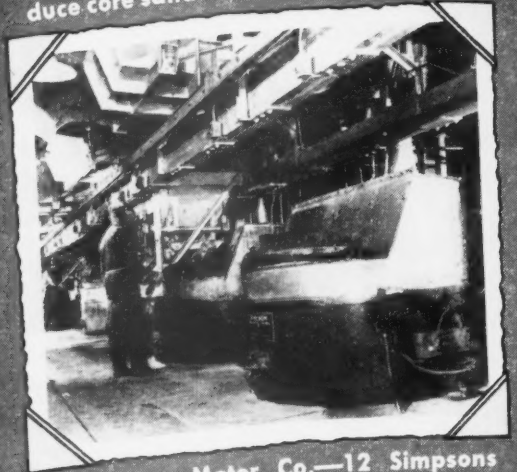
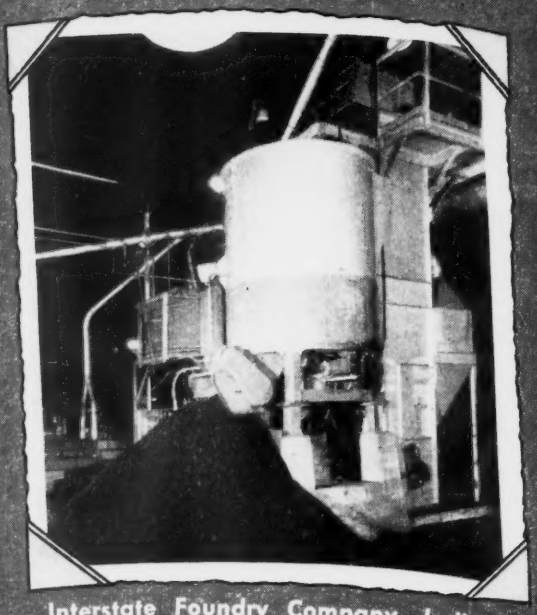
American Brake Shoe Co., Chicago Hts., Ill. One of 3 new Simpsons at American Brake Shoe divisions.

Ford Motor Co.—New Cleveland Foundry uses six #2F Simpsons to produce core sand for Ford 6 Engine blocks.



Studebaker Motor Co.—12 Simpsons provide quality core and molding sand for South Bend, Ind. foundry.



Interstate Foundry Company, Indianapolis, Ind., New #2F "Utility Unit" has improved sand control.

Superior Foundry Co., Cleveland, Ohio. Average moisture variation of only 0.2 of 1% in mixing operations.

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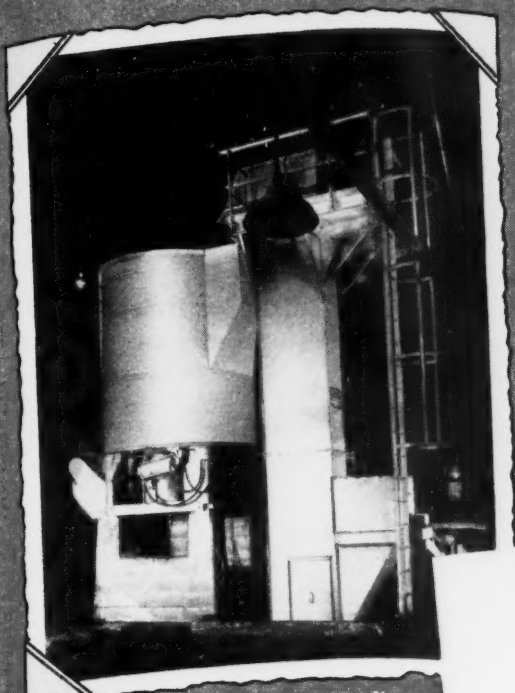
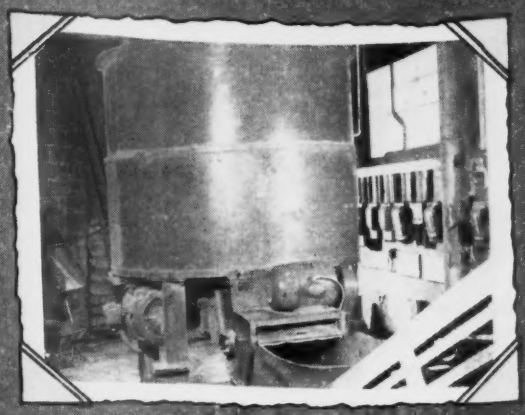
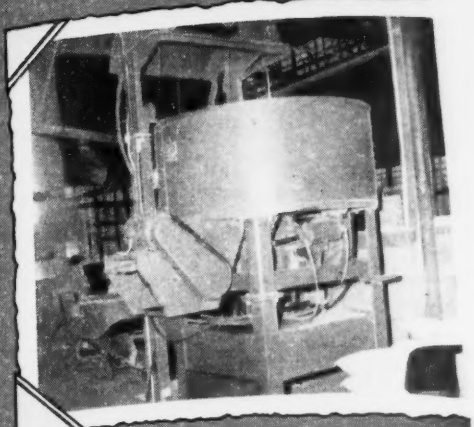


Henry Furnace Company, Medina, Ohio, 50% less bonding material with #2F Mix-Muller.



American Abrasive Metals Co., Irvington, N. J., Saved $2,500 in bond alone in first year.



General Machine Company, Emmaus, Pa. New #2F is their third Simpson Mix-Muller.

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Let a National Engineer show you why Simpson Mix-Mullers are called "The Product of a Practical Foundryman." Write today for complete details . . . and join our album of satisfied users!

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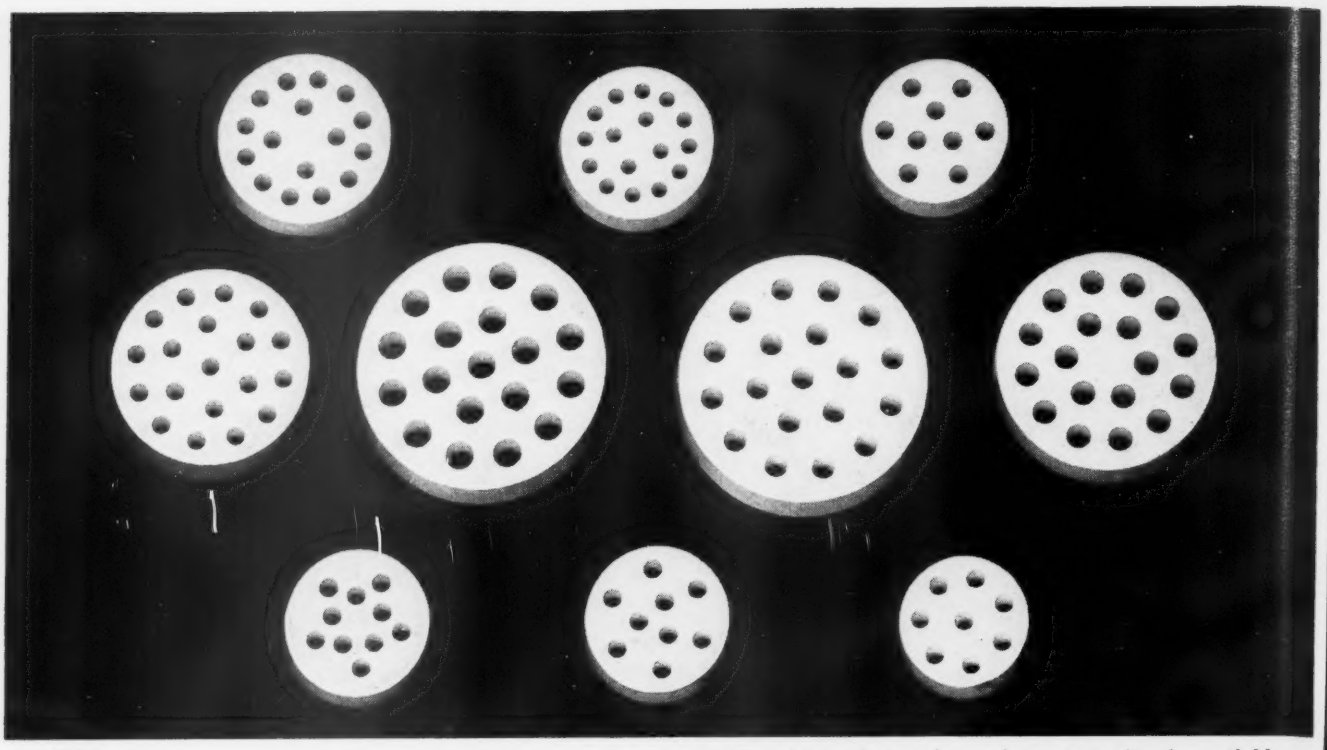

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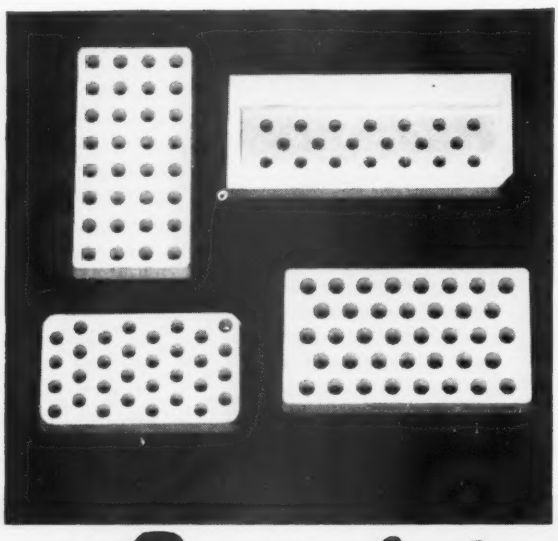

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ELECTROMET *Data Sheet*

A Digest of the Production, Properties, and Uses of Steels and Other Metals

Published by Electro Metallurgical Company, a Division of Union Carbide and Carbon Corporation, 30 East 42nd Street, New York 17, N. Y. • In Canada: Electro Metallurgical Company of Canada, Limited, Welland, Ontario

New Foundry Alloy Neutralizes Effect Of Varying Section in Gray Cast Iron

Low-Carbon Foundry Ferrochrome is a new silicon-chromium alloy specially developed by ELECTROMET for the alloying of cast iron. It is so balanced in composition that it increases the strength and Brinell hardness of gray iron, as well as its resistance to wear and corrosion, without increasing the chilling tendency of the metal.

The alloy has a nominal analysis of 50 per cent chromium and 30 per cent silicon. It has excellent solubility in iron, and the inoculating effect of the silicon content makes it possible to add up to 1 per cent chromium to gray iron as a ladle addition, with no appreciable increase in chill depth. Light-section castings, such as automobile and truck exhaust manifolds and stove parts, may easily be produced in 1 per cent chromium iron by a simple ladle addition of the alloy to any base iron that would be suitable for casting the same parts in unalloyed iron.

Effect on Chill Depth

Fig. 1 illustrates how chill depth was affected by varying additions of the new alloy to a commercial cupola iron analyzing 3.24 per cent carbon and 2.12 per cent silicon, with 0.12 per cent residual chromium. A chill depth of approximately ¼ of an inch was obtained in all of these typical hatchet-type chill-test specimens.

Effect on Mechanical Properties

Although Low-Carbon Foundry Ferrochrome was especially developed for decreasing the section sensitivity of gray iron castings, it is also useful in obtaining moderate increases in the strength of gray iron, when used alone or in combination with the alloys nickel, molybdenum, or vanadium. An unalloyed base iron, analyzing 3.43 per cent carbon and 1.95 per cent silicon, was treated with additions of 0.36 per cent and 0.84 per cent chromium. The following table gives the complete analyses of the irons. It shows how both Brinell hardness and tensile strength were improved by the alloying additions.

Analyses	Brinell Hardness	Tensile Strength
3.43 % total carbon, 1.95% Si, 0.05% Cr.....	202	31,000
3.41% total carbon, 2.20% Si, 0.36% Cr.....	217	35,400
3.32% total carbon, 2.56% Si, 0.84% Cr. ...	228	36,100

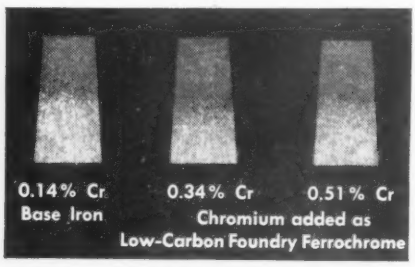

Fig. 1. These fractures of broken chill specimens show the effect on chill of chromium additions made with Low-Carbon Foundry Ferrochrome.

Auto Cylinder Castings

Addition of chromium to cast iron in the form of Low-Carbon Foundry Ferrochrome tends to stabilize the pearlitic structure of the iron, and to eliminate areas of soft secondary ferrite in slowly cooled sections. Moreover, the alloy helps avoid difficulties with chilled corners or edges in thin sections. It is therefore particularly well suited for producing a cylinder-type iron with consistently good structure and improved uniformity of hardness in sections exposed to widely varying cooling rates.

An example of the usefulness of this alloy is illustrated in Fig. 2, which shows strips cut from the bores of three automotive cylinder blocks. The base iron used in these castings was a typical unalloyed cylinder grade of cast iron, analyzing 3.38 per cent total carbon, 2.07 per cent silicon, and 0.08 per cent residual chromium.

The design of these castings was such that a heavy boss close to the cylinder bore caused slow cooling along one side, resulting in a soft area and wide variation in hardness along the length and around the perimeter of the unalloyed cylinder.

The strips illustrated in Fig. 2 were cut from the soft side of the cylinder bore. When subjected to a Rockwell B hardness exploration, casting No. 1 showed a variation in hardness from 92.2 to 80.2 Rockwell B (196 to 150 Brinell*). Casting No. 2 showed a variation from 94.0 to 90.8 Rockwell B (205 to 189 Brinell). Casting No. 3 showed a variation from 95.5 to 90.3 Rockwell B (213 to 187 Brinell).

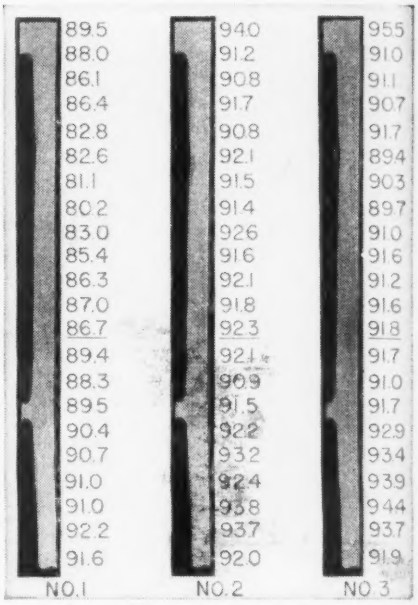

Fig. 2. Average Rockwell B hardness values at indicated positions in strip specimens from the bores of three cylinder block castings. No. 1-Untreated base iron containing 0.08% chromium. No. 2-Treated with 0.31% chromium added as Low-Carbon Foundry Ferrochrome. No. 3-Treated with 0.44% chromium added as Low-Carbon Foundry Ferrochrome.

The small chromium additions made in cylinders Nos. 2 and 3 had a marked effect in reducing the hardness spread and also in stabilizing the desired pearlitic structure in critical areas of the cylinder bore. This provided satisfactory resistance to wear in spite of difficulties introduced by an admittedly difficult design. Similar problems exist in most iron foundries—problems that Low-Carbon Foundry Ferrochrome can help solve with a minimum change in melting practice and at a very reasonable cost.

Booklets Available

Further information about this new ferrochrome is given in the booklets, "New Chromium Alloy Neutralizes Effect of Varying Cooling Rate in Gray Iron" and "Silicon-Chromium Alloy in Complicated Iron Castings." You may obtain copies, free of charge, by writing or phoning to the nearest ELECTROMET office: in Birmingham, Chicago, Cleveland, Detroit, Los Angeles, New York, Pittsburgh, or San Francisco. In Canada: Welland, Ontario.

*All Brinell hardness values were obtained by conversion from Rockwell B.

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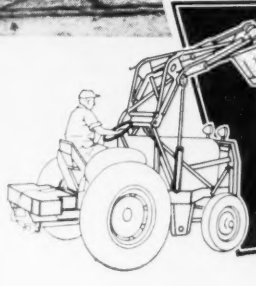

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- **It will be a godsend next winter when your storage yard, parking lot, driveways and sidewalks must be cleaned after a heavy snowfall.**

The Lull Shoveloader will out-perform similar units that cost much more. Features include greater forward reach, higher lift, power down-crowd, full hydraulic control of bucket, sturdy bridge type construction. Bulldozers, cranes, snow-buckets, forks or sweeper attachments are easily added.

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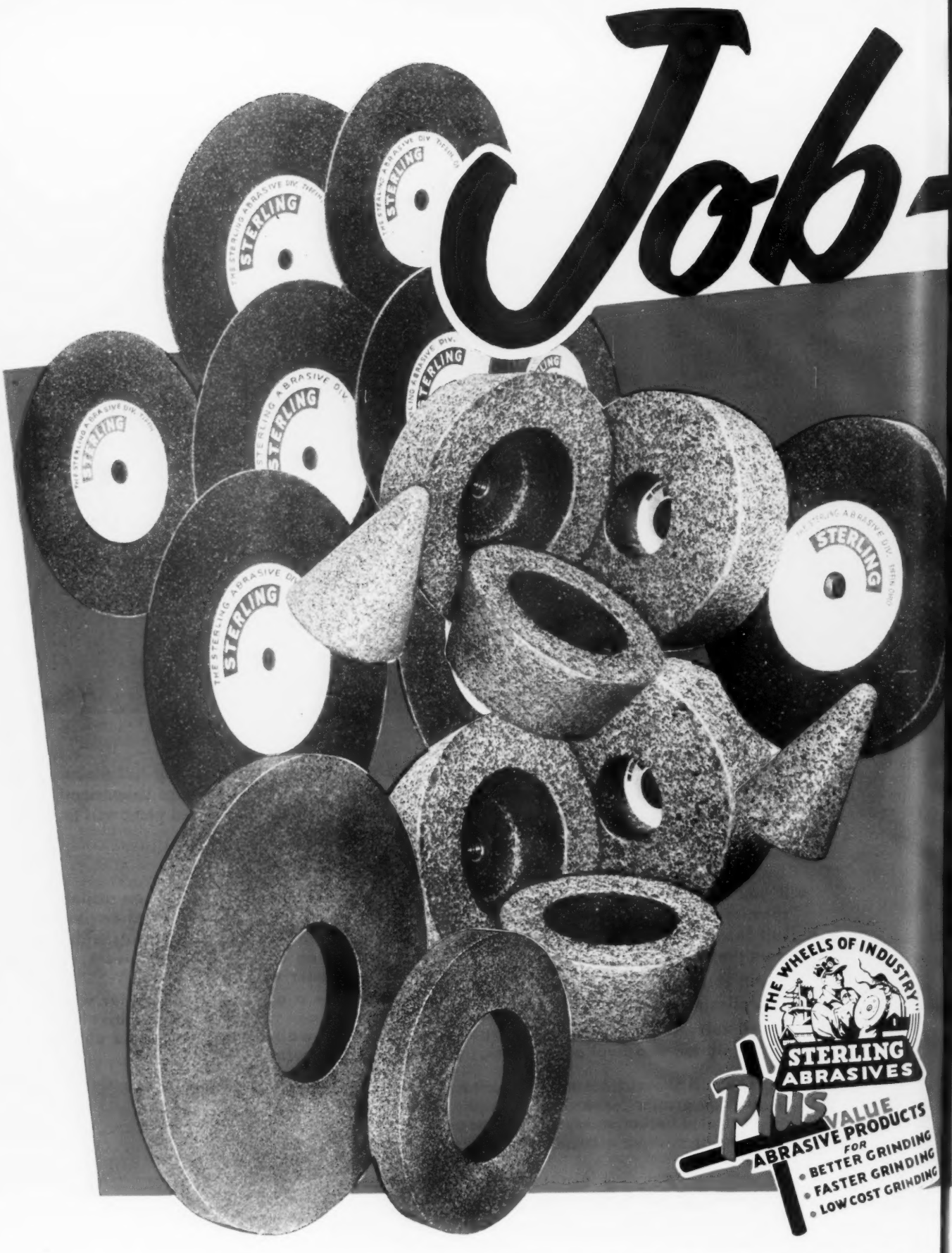

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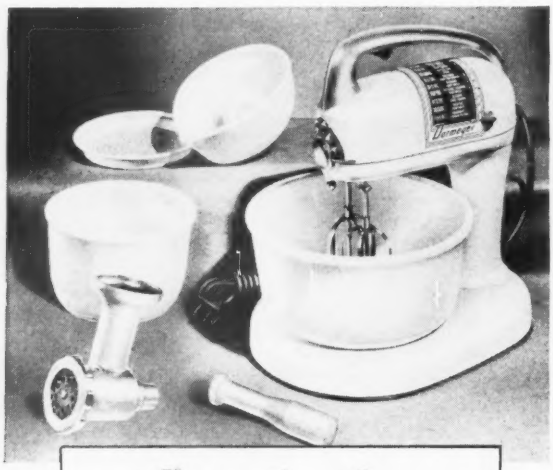

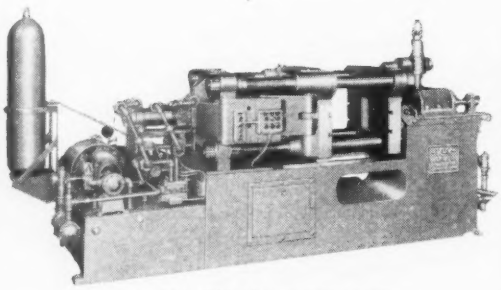

MODEL **BH-30** ILLUSTRATED

Hydraulically operated die casting machine for production of zinc castings weighing up to 10 pounds.

USED TO PRODUCE

DORMEYER

FIRST NAME IN MIXERS

Beats • Mixes • Grinds • Stirs
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...The new Dormeyer Power-Chef performs all! To produce the die cast parts of this famous food-fixer demanded equipment of equal versatility and precision . . . And KUX • First Name in Die Casting Machines "delivered the goods" to perfection!

Kux improved die casting techniques means improved quality production of YOUR PRODUCT. Let Kux engineering know-how, show you how!

Write for illustrated catalog showing complete line of KUX Die Casting Machines.

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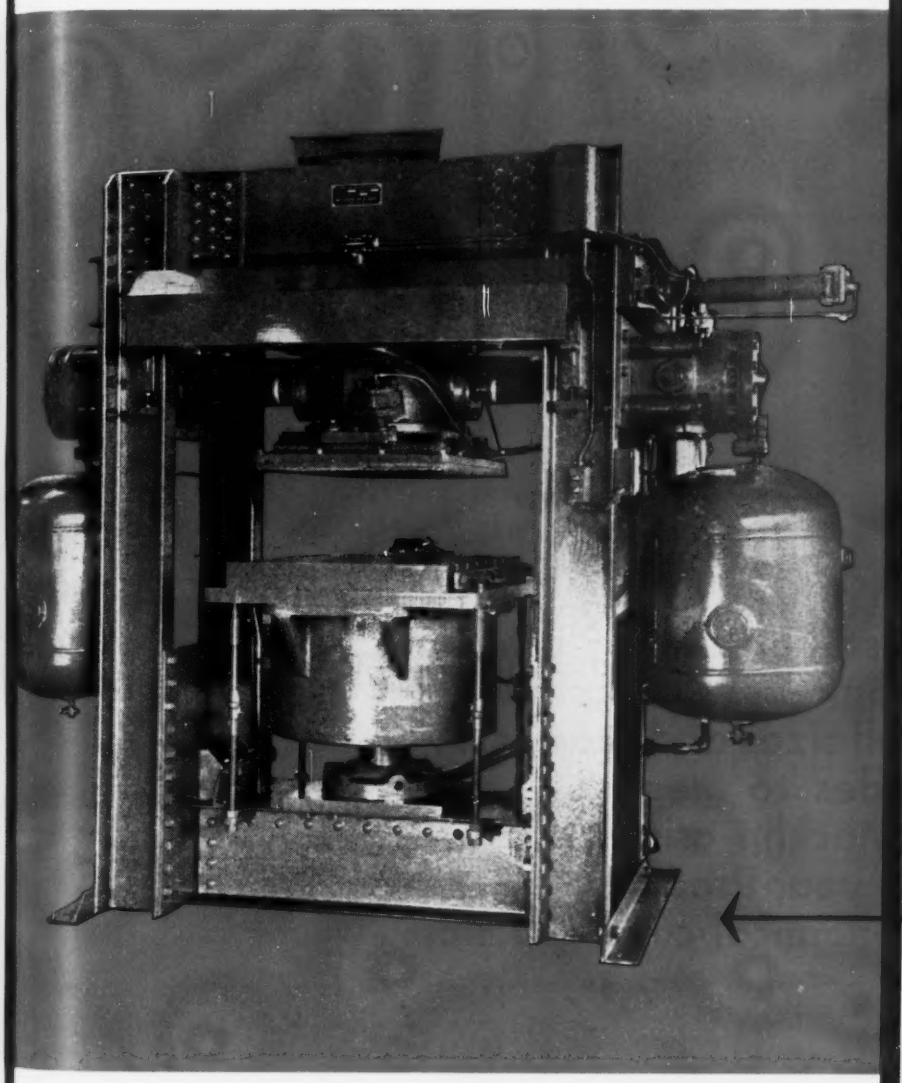
KUX

FIRST NAME IN DIE CASTING MACHINES
SELECTED BY FIRST NAMES IN INDUSTRY

When "TRACTOR" was a brand new name



Demmler Core Blowers were already first . . .

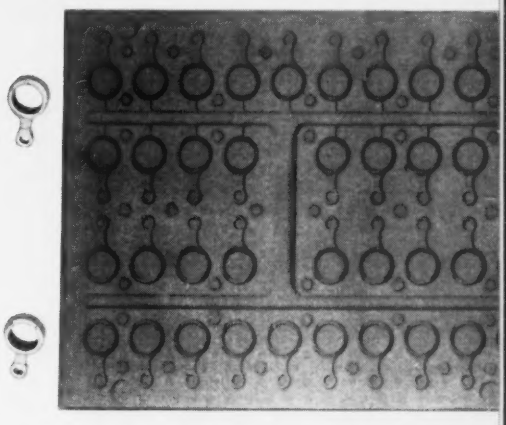
It was in the year 1906 that the term "tractor" first came into general usage. Those early models were big and clumsy but the foundry industry was proud of its contribution. Just 3 years later Demmler introduced the first core blower — one of the factors that allowed the foundry industry to keep pace with the demand for better tractor castings.

A DEMMLER "FIRST"

built especially for D-process shell molding

The 104E is another "first" by Demmler, whose pioneering research has been giving the foundry industry new practical ideas for 43 years. It's another in the famous Demmler "100" series of core blowers. The 104E is especially adapted for D-process shell molding, but can also be used for regular core blowing. It can be furnished with or without the new Demmler sleeve type magazine that will blow ANY core sand without the need for special mixing.

THE DEMMLER 104E



A typical Example of D-process shell molds, blown on the Demmler 104E. Close tolerances and sharp detail are possible with Demmler equipment.

Another Demmler "first"

At right, you see the special D-process core box vent first manufactured by Demmler. Stainless steel screen, 50 mesh, that needs no cleaning. In sizes 3/16" to 1", built especially for D-process shell molding.

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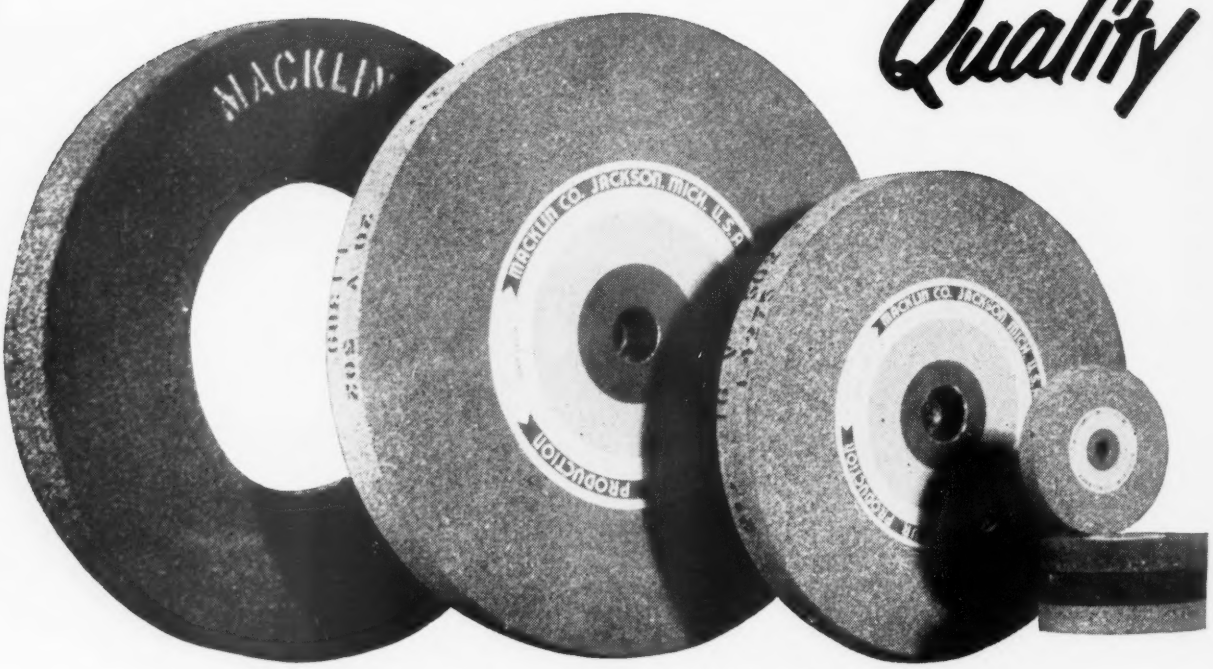
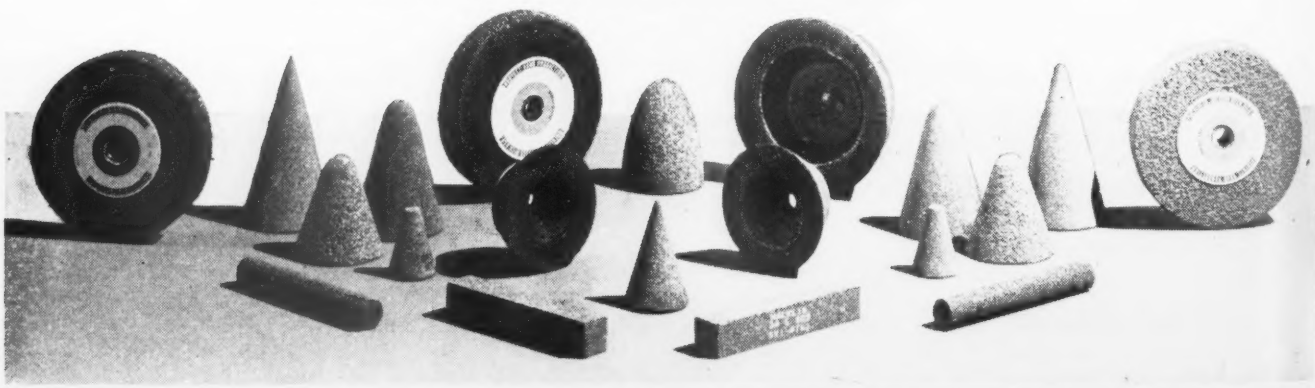


Macklin will solve your grinding problems whether they are portable, swing frame or stand grinding. Available in all sizes and shapes, in grains and grades to meet your particular needs, Macklin grinding wheels will "Protect your Production", with cool, fast, economical cutting action.



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JACKSON, MICHIGAN

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Sales Offices - Birmingham - Buffalo - Chicago - Cincinnati - Cleveland - Columbus - Detroit - Flint - Houston
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1913

1953

40 years of service

This year City Pattern Foundry and Machine Company is celebrating its fortieth year in business; forty years that have marked many gratifying changes in our plant size and facilities. In 1913, we produced our first pattern in a small second story shop with a total complement of two employees. Today in one of the largest and best equipped plants in the industry our employees number close to three hundred.

However, one thing has *not* changed in forty years . . . that is our unvarying goal to produce the finest in pattern and machine work in the most efficient and economical manner possible.

To the many loyal companies who have made possible the City Pattern Foundry & Machine Company of 1953, we pledge continued efforts to constantly keep our skills and facilities abreast of their needs.

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FOUNDRY AND MACHINE CO.

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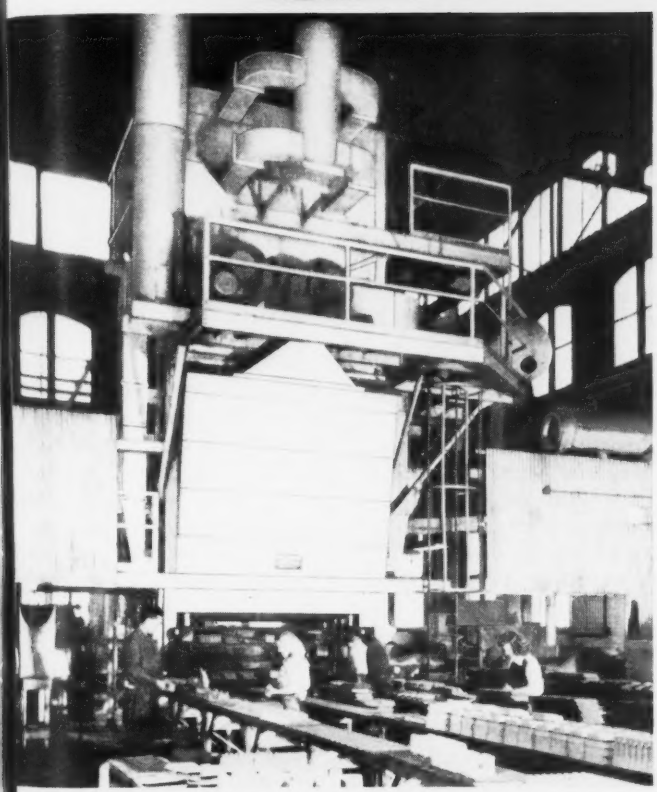
Dependability of COLEMAN OVENS

proved by repeat orders



Coleman Tower Oven
at Eastern Malleable Iron Company

The proper selection of core and mold ovens is vital to profitable casting operation. That's why it's important that you get all the facts about Coleman Ovens and see the performance records that prove their ability to provide substantial savings.

Over 80% of Coleman Ovens are "repeat orders" from customers... conclusive evidence of continuous, dependable performance in foundries of all types. You get over 50 years of know-how and experience in every Coleman Oven, so why gamble with inferior types?

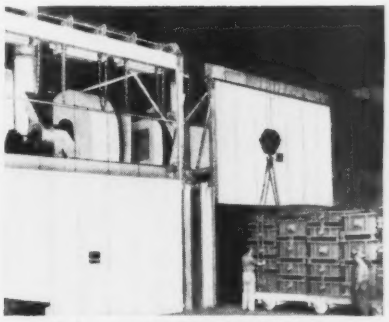
There is a Coleman Core or Mold Oven to meet your requirements whether you have large production runs or small and specialized jobs. Our experienced engineers are available without obligation.

WRITE FOR BULLETIN C

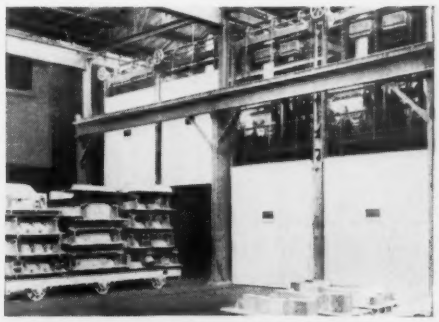
A COMPLETE RANGE OF TYPES AND SIZES
for every core baking and mold drying requirement:

Tower Ovens • Horizontal Conveyor Ovens
Car-Type Core Ovens • Car-Type Mold Ovens
Transrack Ovens • Rolling Drawer Ovens
Portable Core Ovens • Portable Mold Dryers

Coleman Transrack Ovens
at Crucible Steel Castings Co.



Coleman Car-Type Mold Ovens
at Clark Brothers Company



Coleman Car-Type Core Ovens
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MEMBER FEMA

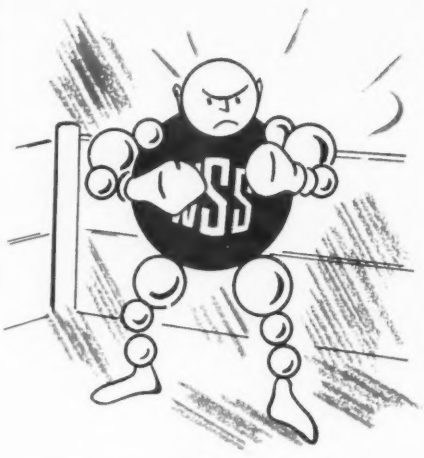
WORLD'S OLDEST AND LARGEST FOUNDRY OVEN SPECIALISTS

only WHEELABRATOR

hardness for

FASTER CLEANING

The hardness of this super shot (42 to 50 Rockwell C) concentrates the impact of each pellet on the work so that sand and scale are quickly removed. This hardness is achieved by combining the strength of an electric furnace steel with a double heat treatment to produce a tempered martensite microstructure, the hardest and toughest iron carbon alloy.



toughness and solidity for

LONGER LIFE

The toughness and native impact strength of Wheelabrator Steel Shot considerably reduces shot consumption. All shot is round and solid . . . free from surface cracks. No conditioning is required and it stays round throughout its life. Because it lasts so much longer it lowers cleaning costs per ton.

rebound for

GREATER COVERAG

The unique rebound properti Wheelabrator Steel Shot cau to carom from part to part, p trating and cleaning intricate ties not reached by other sives. Rebounding on impa does not lodge in the work thus eliminates the problem o bedment. In machining parts, tool life is thereby gr increased.

plus

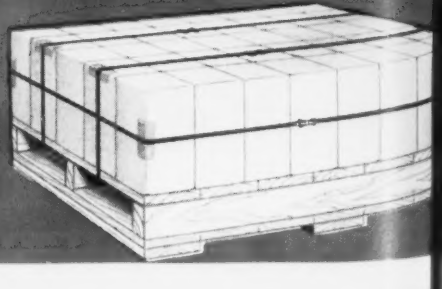
50 LB. CARTONS and PALLETIZING

for safety—convenience—and lower cost to yo

Wheelabrator Steel Shot is now packaged in strong, easy-to-handle 50 lb. cartons—more rugged than antiquated, heavy 100 lb. burlap bags. Shipments of 1 Ton or more are securely strapped to expendable pallets (40 cartons to a pallet) for safer transportation and easier handling and storage. This "Plus" savings is yours *at no extra cost!*

Easy-to-carry, easy-to-pour, this new 50 lb. carton reduces strain and fatigue in abrasive handling.

A Palletized 1 Ton Shipment



OSTEEL SHOT *has all these advantages*

ways round for

RAGE W MAINTENANCE

roperties he roundness of Wheelabrator ot cause eel Shot drastically reduces wear part, p replaceable parts and maintetricate nce costs. It is round when other aced into service and stays impact und throughout its life. This work roperty practically eliminates the blem of arp edges that produce excesning ve wear on cleaning equipment eby gre , minimizing down time, maintnance and parts costs.

warranted quality for

UNIFORM RESULTS

You get the same low-cost, highly effective cleaning performance from Wheelabrator Steel Shot every day of the week — every week of the year. There is no variance in quality from shipment to shipment as found with other abrasives. Uniformity of carbon content, hardness, microstructure and screen analysis is assured by the written warranty.

super performance for

LOWEST OVERALL CLEANING COSTS

Performance records in plants throughout the country and on every type of product prove convincingly that the lowest overall cleaning costs are achieved with Wheelabrator Steel Shot. Combining hardness with toughness, this superior shot will clean or peen faster, at lower cost, than any other abrasive. Try it and prove it for yourself.

plus

A SCHEDULED DELIVERY PLAN

that assures you the size and quality you need—when you need it

Pioneering Developments keep Wheelabrator Steel Shot First in Abrasives

Send for Bulletin 89A

Bulletin 89A tells the complete story about Wheelabrator Steel Shot and what it means to the user in terms of performance and economy. Write for your copy today.

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American

WHEELABRATOR & EQUIPMENT CORP.

505 S. Byrkit St., Mishawaka, Indiana

IMPROVE
Sand Control...

CUT
Scrap Losses...

DROP
Sand Temperature...
and

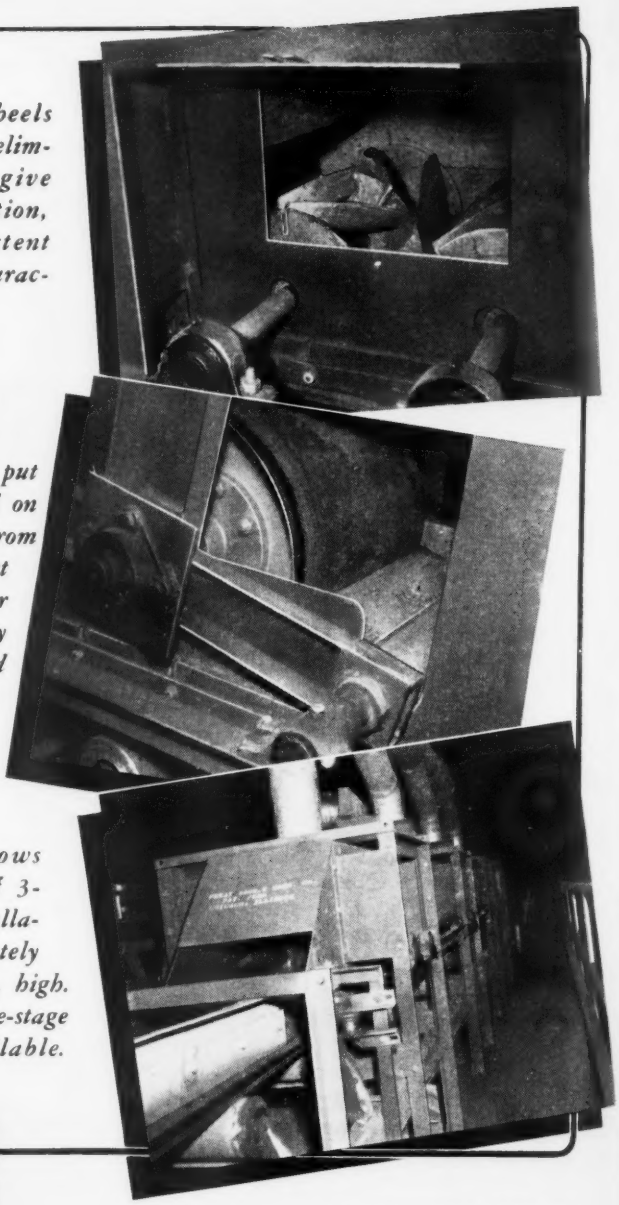
DELIVER *MORE* SAND—*FASTER!*

Here's what one of the efficient PEKAY Mixer-Mullers now in use is doing: increasing *Permeability;* giving a big boost to *Green Compression Strength;* maintaining correct *Moisture Content;* and delivering this *better* sand at an increase in volume per hour of 85%!

What's more, the amount of bonding clay and Bentonite added to the prepared sand has been *sliced in half.*

And *Maintenance Costs* are sharply cut because this smartly engineered unit is so easy to inspect and to service. *Power Costs* drop sharply, too.

CUTTER wheels are designed to eliminate lumps, give even distribution, provide consistent free-flowing characteristics.



Muller wheels put sand (delivered on conveyor belt from cutters) in perfect condition for molds. Capacity can be increased as desired.

END view shows compactness of 3-stage unit installation, approximately 20 ft. long, 2 ft. high. Single or Double-stage units are available.

PEKAY

Mixer-Muller

for better sand conditioning

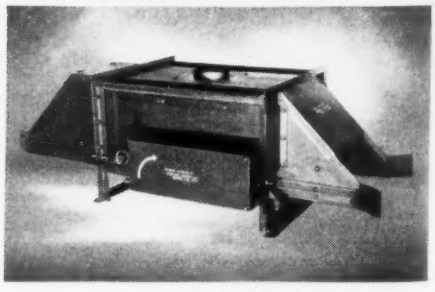
THE PURCHASE PRICE IS LESS—AND INSTALLATION COSTS ARE MUCH LOWER. No excessive initial investment is needed to put the PEKAY Mixer-Muller to work in your plant immediately to save you money and give you faster production of a better product. Installation usually takes only about 100 man-hours of labor.

On every count, this unit deserves your careful consideration.

AND HERE'S ANOTHER LOW-COST WAY TO BETTER PRODUCTION

PEKAY AIRATOR

Easy to install—low initial cost—little maintenance



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M-T-MATIC Elevator Conveyor Buckets
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Gentlemen:

Please send me details and price information on the PEKAY Mixer-Muller.

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COMPANY _____

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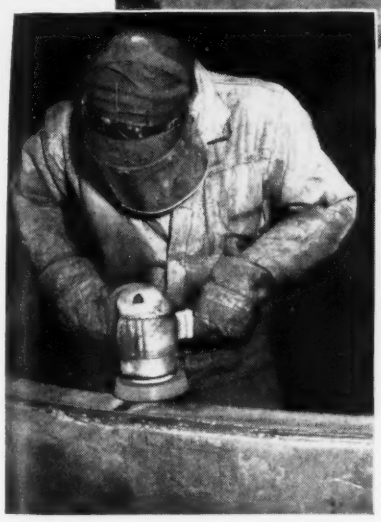

TAKES THE GRIND OUT OF GRINDING!

THAT'S RIGHT! The CP Steel Clad Grinder takes the continuous beatings of heavy industrial usage right in its stride—and with practically no time out for maintenance. Spindle and motor housing are of lightweight steel clad construction for longer life and ease of handling. Constant speed governor and a new, larger horsepower air motor holds wheel at most efficient cutting speed—from no load to full load, cuts grinding time—takes the grind out of grinding! Available in five sizes from 4″ to 8″ grinders and many of the parts are interchangeable between sizes. Write for Catalogue 564, *Chicago Pneumatic Tool Company, 8 East 44th Street, New York 17, N. Y.*

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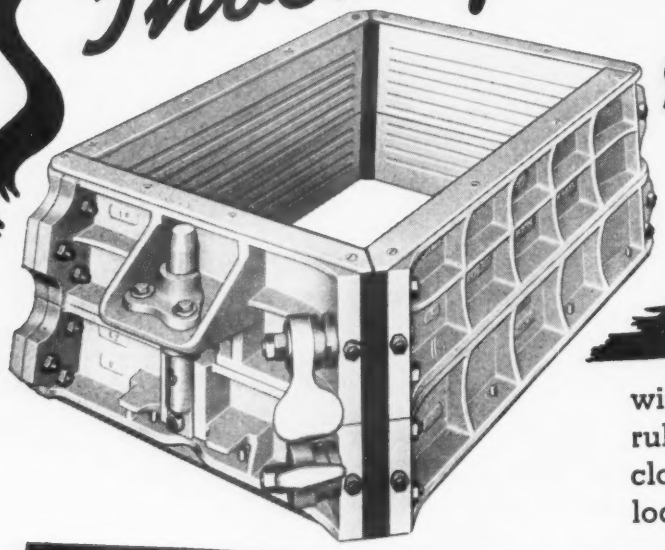
Investigate

the new

FREMONT SPREADLOCK FLASK



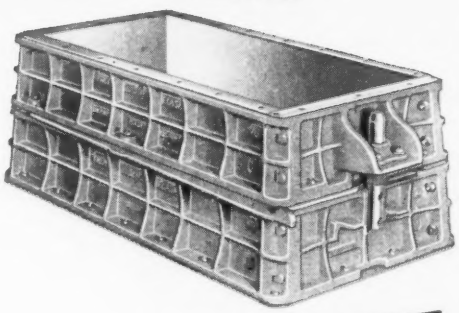
with the long-life, easily replaceable, live-rubber corner inserts which completely close the corner gaps so that no sand can lodge in the open corners.

PERFECT ALIGNMENT Indefinitely!

is guaranteed by the one-inch GROOV-LOCK FOOLPROOF PIN on

FREMONT STANDARD SLIP FLASKS

They are particularly adapted to cope or drag pattern jobs. Other types of standard pin fittings are also available. Solid, bolted and welded corner construction is a feature of Fremont Standard Slip Flasks.



Fremont Magnesium Flasks point the way to more exacting work. Accurately machined inside surfaces and flanges. Steel-faced top and bottom flanges. Magnesium has twice the tensile strength of aluminum, thus assuring longer service, and magnesium weighs ⅓ less than aluminum, making for easier handling.

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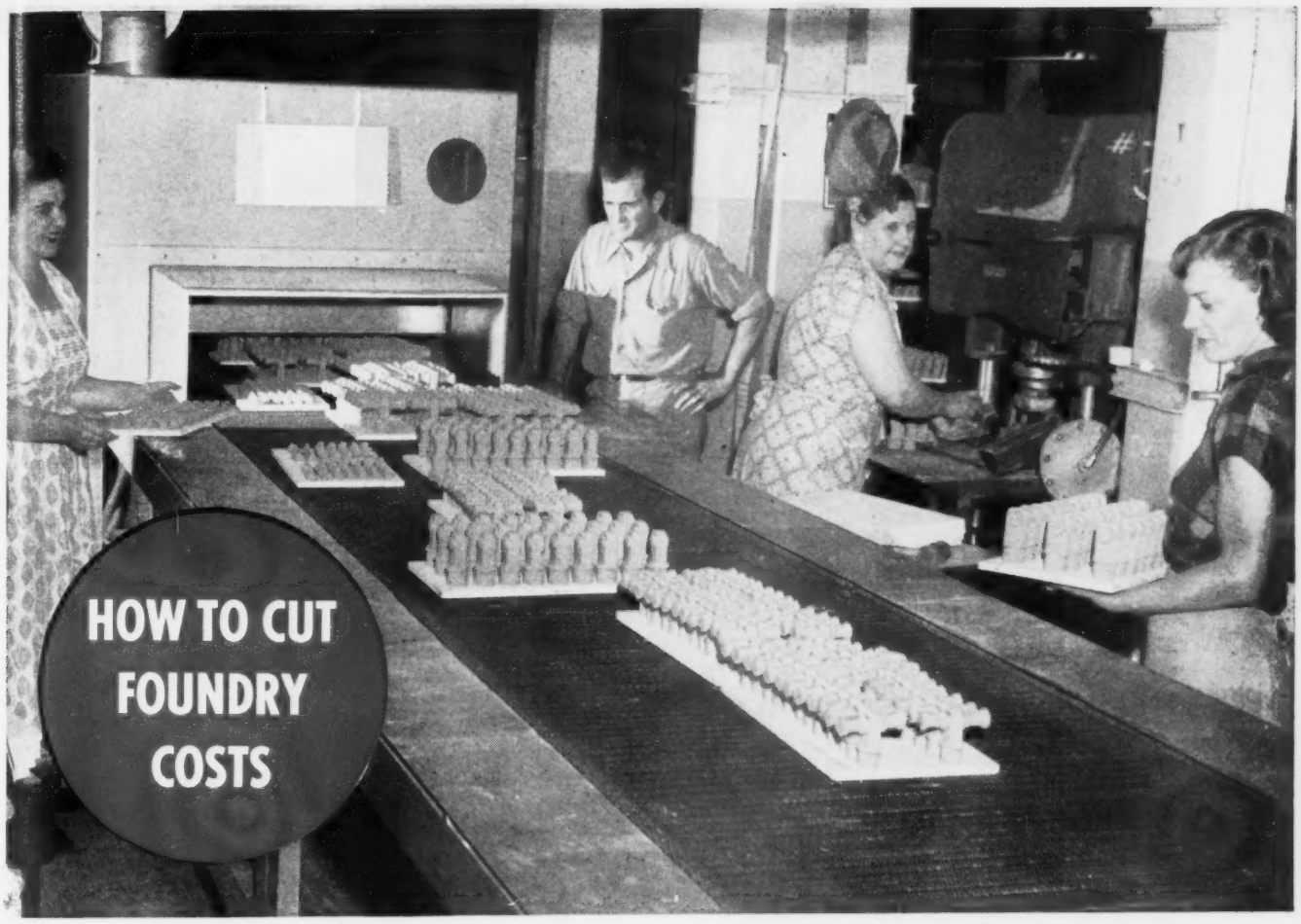
THE FREMONT FLASK COMPANY

FREMONT, OHIO



Get the facts

ON ELECTRONIC CORE BAKING

FOUNDRIES using THERMEX* Electronic Core-baking Equipment report greater core room yields, resulting from high baking speed. Labor costs are cut drastically. In addition, rejects and irregularities are reduced, and dimensional stability improved.

A new THERMEX booklet will bring you up-to-date on the efficiency of modern electronic core-baking. It includes engineering economy studies made in various foundries. Comparative cost figures for old and new methods are based on actual usage, and have been approved and released *by the foundries concerned.*

Get the latest facts for yourself—send the coupon now. The Girdler Company, Thermex Division, Louisville 1, Kentucky.

*THERMEX—Trade Mark Reg. U. S. Pat. Off.

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Please send me the new booklet on Electronic Core-baking

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For cores such as this one for a lathe bed, Sessions finds Truline superior to any binder it has previously used.

TRULINE® BINDER CUTS CLEANING TIME 30% AND SPEEDS CORE BAKING, TOO

The Sessions Foundry Company, Bristol, Connecticut, reports these advantages for Truline over the binder it previously used in cores: quicker baking at lower temperatures (400-450°F.); sharper core edges; easy collapsibility, reducing cleaning time approximately 30%; smoother casting surface; and less cracking of castings.

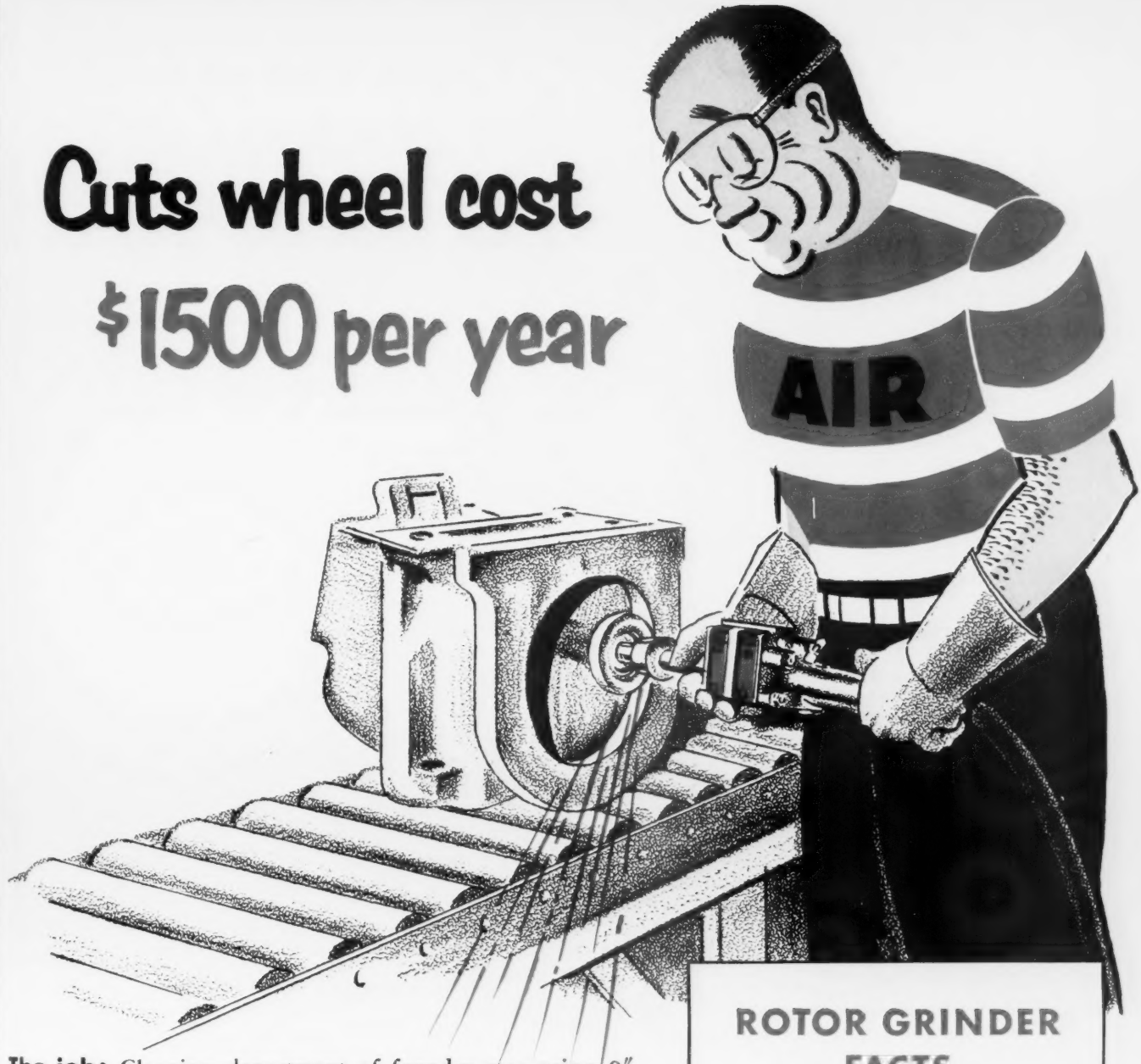
Whether your castings are large or small, iron or steel, our foundry service men will be glad to show you what Truline can do for you.

Naval Stores Department
HERCULES POWDER COMPANY
INCORPORATED
920 King St., Wilmington 99, Del.

This 15,750-lb. iron casting, clean and sound, was made from the Truline-bonded core pictured in the photograph at top.

NF53-5

Cuts wheel cost $1500 per year



The job: Cleaning department of foundry was using 8″ wheels with 4500 rpm grinders. When worn down to 5″ or 6″, wheels lost surface speed and metal removal dropped off. Wheels were laid aside or thrown away at this point.

Solution: Rotor Analyst suggested use of two Rotor 6000 rpm air grinders to use up discarded stub wheels.

Results: Investment of $400 in new Rotor Grinders saves $1500 yearly in wheel costs.

How much will this idea save in *your* plant? Ask your Rotor Analyst for a trial grinder to find out!

ROTOR GRINDER FACTS

Rotor D125—6000 rpm—9¾ lbs.
Rotor D88—6000 rpm—9 lbs.

Others from 3100 to 20,000 rpm. Straight or spade handles. Ask for Catalog No. 38.

YOU'LL DO A BETTER JOB

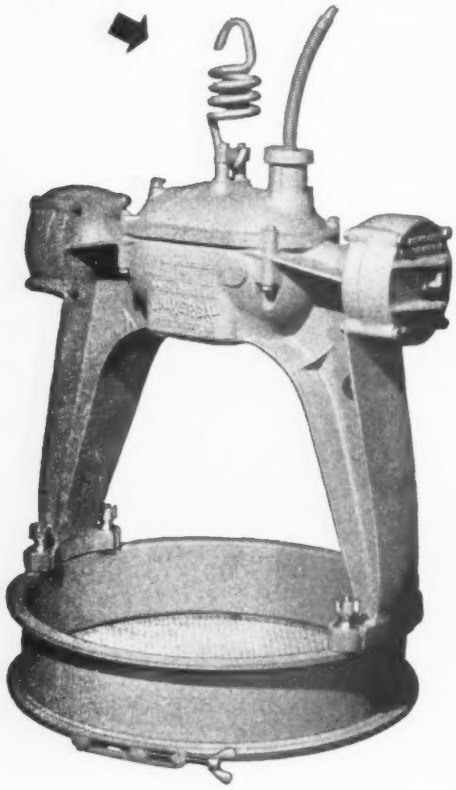
with H. V. ADAMS DESIGNED

HIGH EFFICIENCY FOUNDRY TOOLS

"UNIVERSAL FREE WHEELING"

FOUNDRY SAND RIDDLE

with the Double Eight Vibration

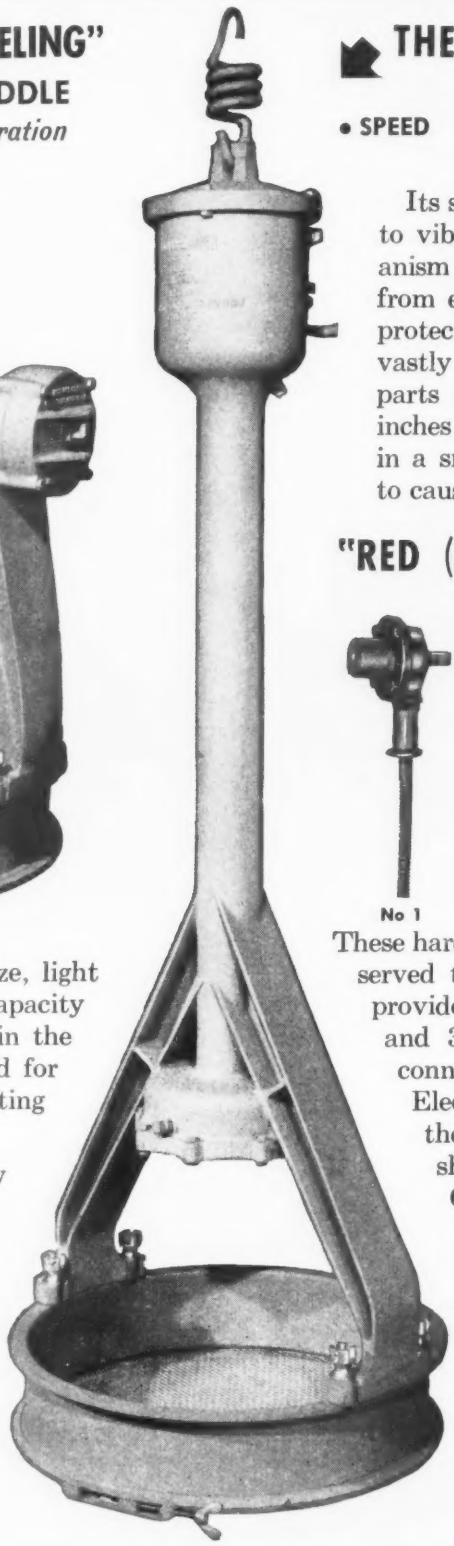


Because of its convenient size, light weight and good riddling capacity it long has been a favorite in the foundry. It also can be used for mixing core sand or for sifting sand directly into molds.

The mechanism is entirely enclosed protecting it from harmful dust and grit.

The main frame is cast in very strong tough aluminum.

It uses quick change ferruled sieves with 20 in. diameter sifting area. There are no loose wires to harm hands.



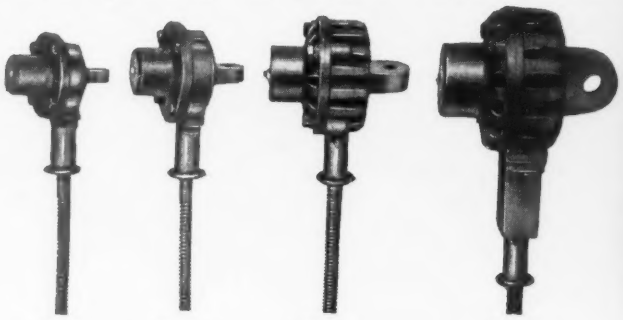
THE "ROTOPLANE" SPEED SIFTER

WILL GIVE YOU

• SPEED • ECONOMY • SAFETY • LONGER LIFE
• GREATER SIFTING CAPACITY

Its sturdy one-piece frame and long shaft add to vibration effectiveness. The sealed-in mechanism assures protection of motor and bearings from exposure to dust and grit. This sealed in protection and "Rotoplane's" free-rotary action vastly increase bearing life. No exposed moving parts endanger the operator. Sieves have 20 inches diameter clear sifting area—are mounted in a smooth steel ferrule with no jagged edges to cause dangerous cuts and scratches.

"RED (Devil) ELECTRIC" VIBRATORS



No 1 No. 2 No. 5 No. 9

These hard hitting Adams designed Vibrators have served the foundries for over 30 years. They are provided with a 6 foot 3 wire authorized cable and 3 wire grounded connector which, when connected with our 3 wire grounded Red Electric Knee Switch, automatically grounds the vibrator protecting the worker from shock. The vibrators have passed the U. S. Government code inspection.

Other Foundry Products:

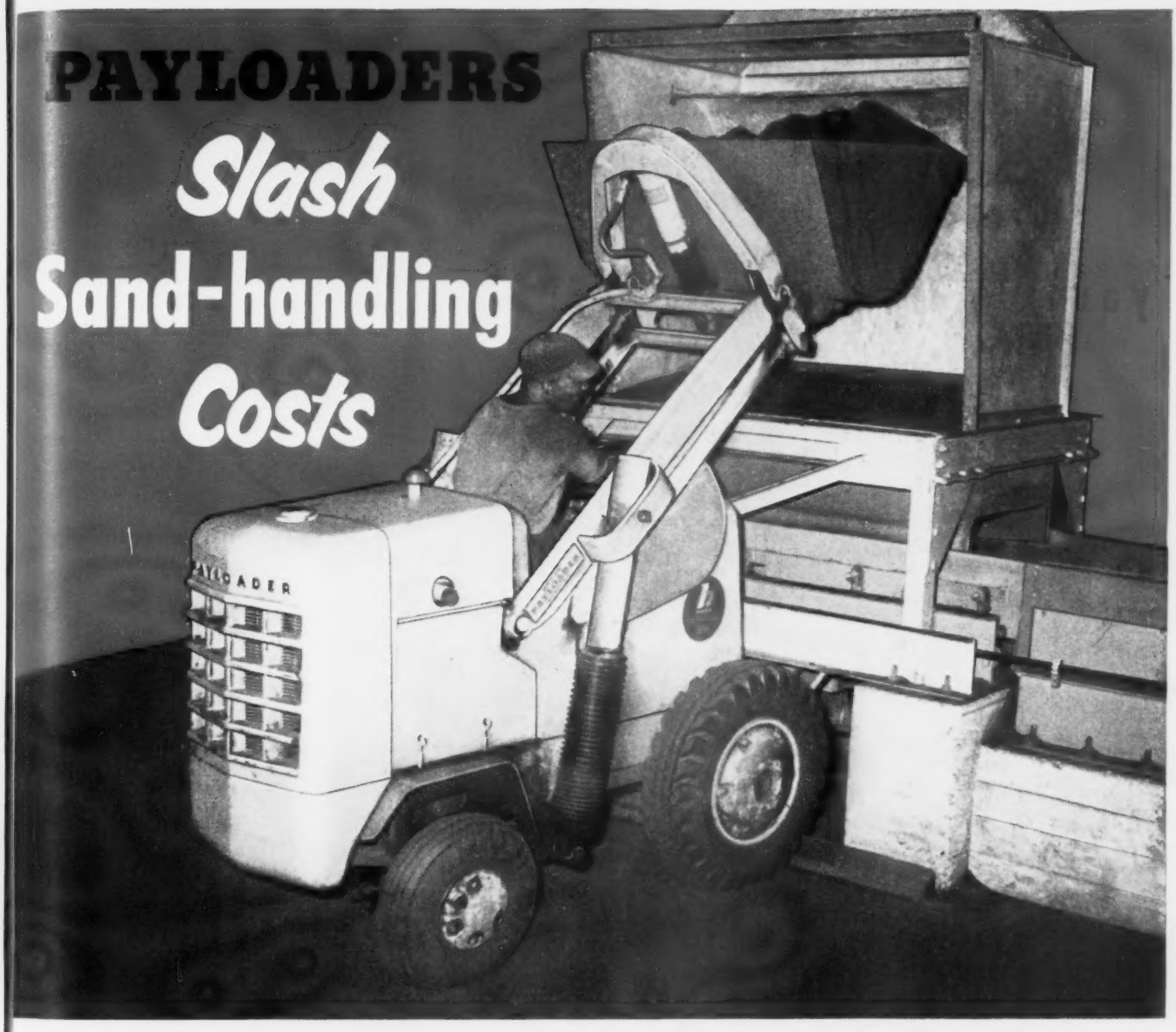
- No. 11 NOISELESS TYPE VIBRATOR
- A-20 ELECTRIC VIBRATOR
- RED ELECTRIC KNEE SWITCHES
- "ROTO" ADJUSTABLE BIN VIBRATOR
- 2 MIN. UNIVERSAL FINENESS TEST SIFTER.
- UNIVERSAL TRIPOD CARRIER

ORDER ALL SIFTERS AND VIBRATORS WITH GROUND WIRE!!

FOUNDRY SUPPLIES MANUFACTURING CO., NOT INC.

2221 Orchard Street - Chicago 14, Illinois

Established 1918 Cable Address: "Rotoplane Chicago" H. V. ADAMS, Mgr.



In hundreds of foundries "PAYLOADERS" have effected substantial reductions in sand-handling costs and eliminated many other laborious material handling jobs. These unusual tractor-shovels unload sand from boxcars, carry it to storage and mullers . . . deliver it to molding stations and core makers . . . scoop it from the pouring floors and clean-out rooms . . . return sand for reclaiming . . . windrow it for the cutter. Fast, nimble "PAYLOADERS" also save time, labor and costs on other jobs—handling small castings, slag, coke, coal, ashes, waste and snow. They work inside and outdoors on pavement or ground.

It will pay you to get the facts on the "PAYLOADER" way to faster, cheaper handling costs. Your "PAYLOADER" Distributor is ready to give them to you. Call him today or write The Frank G. Hough Co., 703 Sunnyside Avenue, Libertyville, Illinois.

free **HANDBOOK**

Tells how and where to look for signs of inefficient bulk-materials handling . . . how to analyze, organize and set up an efficient handling system . . . plus many useful tables and data. Write for "Bulk Materials Handbook."

SAY "HUFF"

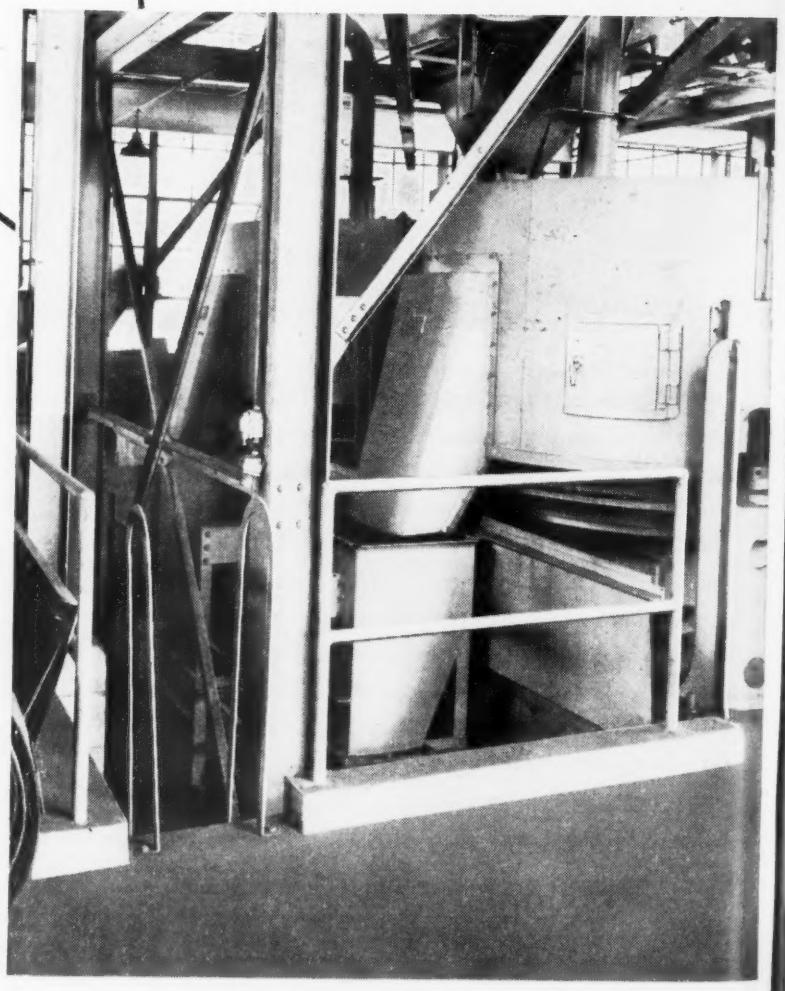
PAYLOADER®

THE FRANK G. HOUGH CO. • Since 1920

you can make SAND PREPARATION automatic

with a

CLEARFIELD MIXER



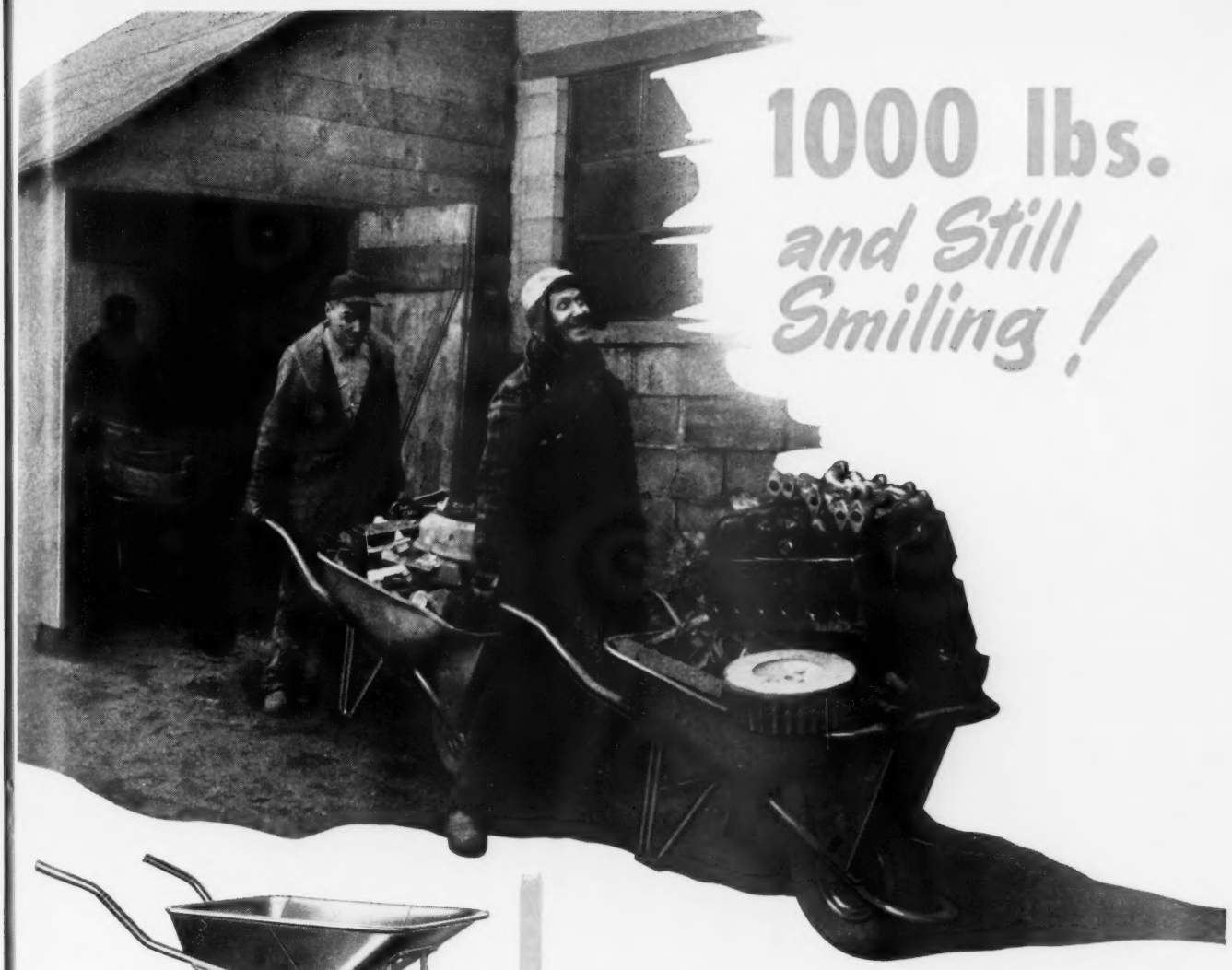
All Clearfield Mixers can be completely controlled by electric timing devices, giving you fully automatic sand preparation. You'll save time, cut costs and assure yourself of a continuous supply of sand prepared exactly as you want it when you employ a Clearfield automatic mixer.

But whether you want automatic or manual control, there's a Clearfield Mixer to provide the exact answer to your sand preparation needs. *Write today for catalog No. 83 for complete details.*

Clearfield Mixer
Mixes, Tempers
Aerates

CLEARFIELD MACHINE CO.

CLEARFIELD, PENNSYLVANIA



Model D4-S

The ideal foundry barrow for hauling sand, scrap, castings, etc. 14 ga. welded steel tray. 4 cu. ft. capacity.

Model DF4-S 12 Ga. Extra Heavy Duty

A husky steel plate reinforcement supports the front, back and bottom of tray. Prevents breakage and distortion. Adds years to the life of the barrow. 4 cu. ft. capacity.

Barrow Men Prefer Sterlings Because 80% of Load is Carried by the Wheel

Wheelbarrow Loads in foundries are unusually heavy. Castings, scrap, sand, etc. must be transported, swiftly and economically. But the barrow men don't mind the job if they can carry the loads in easy-wheeling Sterlings.

The scientifically balanced construction of Sterling Wheelbarrows actually takes 80% of the load off the arms and backs of the barrow men. This increases foundry efficiency . . . peps up the men . . . allows more loads to be hauled each day . . . reduces hauling costs.

Sterling's tubular steel frame, reinforced to give additional strength at points where stress and strains are greatest, fortifies the Sterling barrow for the unusually severe treatment in foundries. Sterlings can take hard, everyday punishment and come back for more.

Play safe. Specify Sterling on your next foundry barrow order. Prompt shipment.

Sterling WHEELBARROW CO.

Milwaukee 14, Wisconsin, U.S.A.

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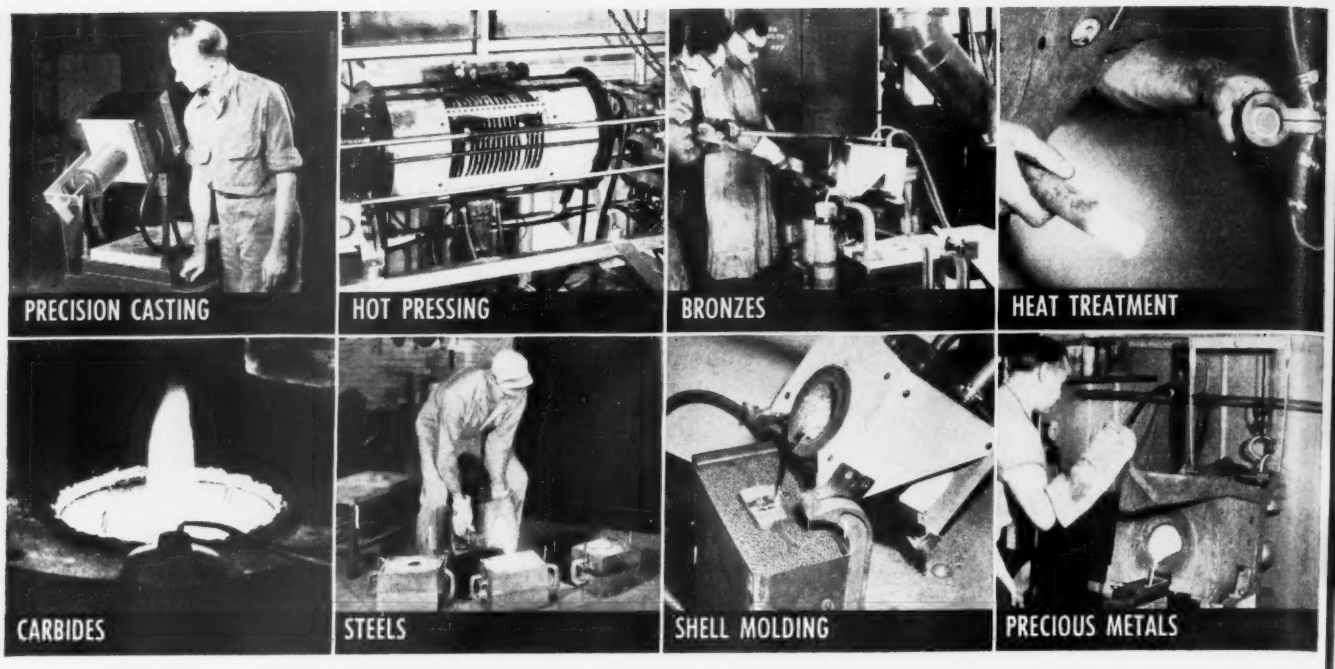

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AJAX-NORTHRUP Converter-Operated FURNACES

The 20 kw. converter will melt 17 pounds of steel in 40 minutes. Maximum capacity is 30 pounds of steel or 60 pounds of bronze. The larger 40 kw. unit melts faster, will handle up to 50 pounds of steel. The 6 kw. unit melts a pound of steel in 8 minutes. Controlled temperatures to 4500 deg. F and higher make these furnaces ideal for sintering and hot pressing carbides.

Ajax-Northrup converters are compact and self resonating. They require no special foundation or wiring—and they're certified to meet F. C. C. regulations.

Thousands of these units are in daily use. Many of today's prominent industries actually got their start with an Ajax-Northrup 20 kw. converter. Write for bulletins.

20 KW CONVERTER

Since 1916

AJAX NORTHRUP

INDUCTION HEATING AND MELTING

AJAX ELECTROTHERMIC CORPORATION
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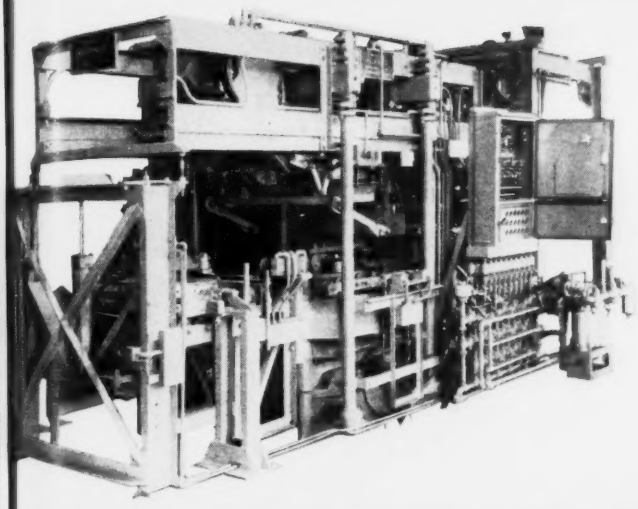


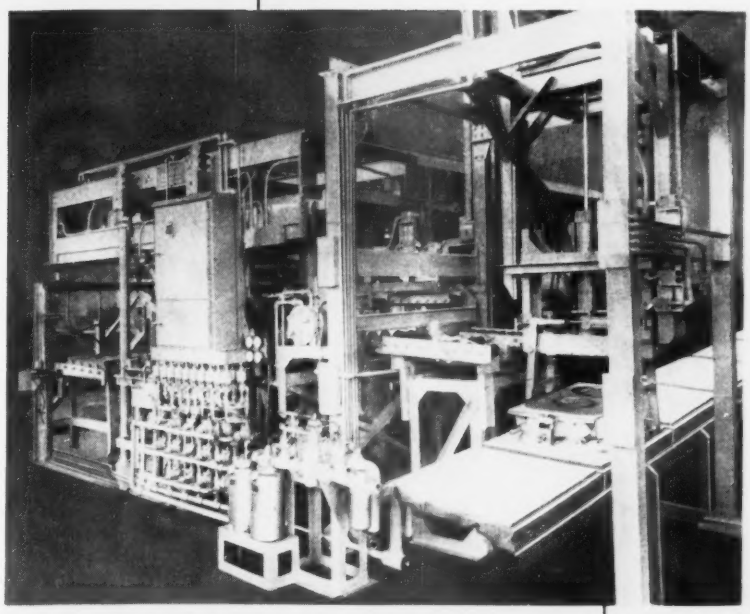
SHOWS FLASK ON FEED-IN ELEVATOR

"Push-Button" Operation Means The Ultimate in

INCREASED PRODUCTION . . .

ECONOMY . . .

QUALITY MOLDS



SHOWS COMPLETED MOLD AFTER BEING TURNED OVER, AUTOMATICALLY TRANSFERRED TO MOLD CONVEYOR

Every Nicholls Molding Machine is precision-built to insure the production of *continuously* better molds. They eliminate guess-work and costly mistakes. They put an end to dangerous risks. They effect major savings in materials and maintenance costs.

This new #24 type C machine has a pneumatic pattern draw, is equipped with an air-operated car type squeeze head, built-in flask roll-in, roll-out device and a measuring sand hopper. Other Nicholls advantages include a flask indexing device and sand spill upset; flask feed-in elevator; mold turnover and transfer... PLUS full "push-button" automatic operation.

William H. Nicholls Co., Inc., Richmond Hill 18, Long Island, N. Y.

Always rely on "Nicholls" for the best in heavy-duty molding machines

NICHOLLS

HERE'S YOUR ANSWER

to faster, better, uniform, low-cost blast cleaning

IN A NUTSHELL

That's a broad claim. We don't expect you to accept it without substantiation. We hope you will ask us to present our proof. All we ask, is that you let it be on-*your*-job proof. Proof we know you'll believe! The only proof we want you to accept.

Like many production finishing men, perhaps you have always taken shot and grit pretty much for granted. If so, you have a surprise coming, for Hi-Grade Shot and Grit IS different—so superior, in so many ways—you can only appreciate its true value by job-testing the material yourself. That way you get proof of performance you can accept as conclusive. Order a trial quantity today. We'll let results speak for themselves. You'll find they say, "*Hi-Grade is best by test*"—your answer to faster, better, uniform, low-cost blast cleaning, in a nutshell.

Packed in 100 lb. Bags—Ready For Immediate Shipment

YOU GET TO THE MEAT OF HARD-TO-CRACK BLAST CLEANING PROBLEMS FASTER WITH

HI-GRADE SHOT AND GRIT

- **YOU GET MORE EFFICIENT PEENING AND CLEANING.** Hi-Grade Shot and Grit is uniform, especially processed to withstand repeated strain, stress and wear.
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- **YOU GET A LOWERED COST PER TON OF CASTINGS CLEANED** because Hi-Grade Shot and Grit has a longer re-use value. Special alloying and tempering process minimizes impact fractures.

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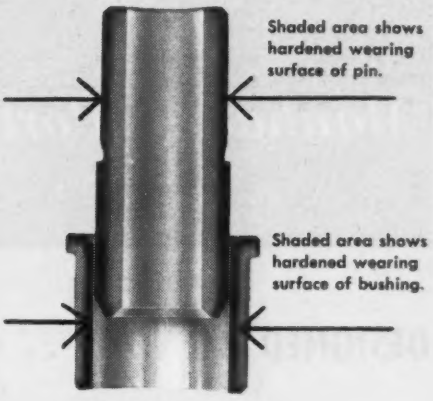
The wearing surfaces of Universal flask pins and bushings are carburized and hardened so they can take long, rigorous wear and rough treatment in the foundry. Both pins and bushings are double quenched and double drawn to produce strong ductile cores with a fine grain structure that will withstand considerable stress and strain without breaking. Universal flask pins and bushings are precision ground to extremely close tolerances to insure instant, accurate alignment of cope and drag. Plain, taper, round, hexagonal and threaded series pins and bushings are available in a complete range of sizes as regular stock items. For complete information, write to the office nearest you — Universal Engineering Sales Co., 1060 Broad St., Newark 2, N. J.; 5035 Sixth Ave., Kenosha, Wisc., or the home office.



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UNIVERSAL ENGINEERING COMPANY FRANKENMUTH 4, MICHIGAN

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DESIGNED BY YOU . . . Manhattan Portable Wheels are built to solve the specific problems encou tered in your plant . . . to remove *more* metal . . . *faster* . . . at *lower* cost. Ye the type of abrasive, grain size, hardness, structure and bond of the Manhatta Portable Wheel you buy are determined by the specific requirements of you work . . . by a careful analysis of *your* needs . . . This is typical Manhattan service . . . of Manhattan Abrasive Wheels . . . built with th job in mind. The result—uniform quality, longer life, and more output pe man-hour. You get MORE USE PER DOLLAR when you specify "Manhattan"

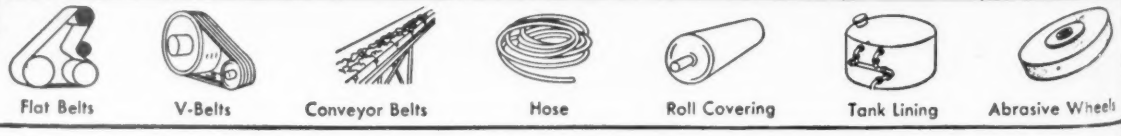
GRINDING WHEEL INSTITUTE MEMBER

WRITE TO ABRASIVE WHEEL DEPARTMEN

R/M

MANHATTAN RUBBER DIVISION — PASSAIC, NEW JERSEY

RAYBESTOS-MANHATTAN, INC.



Other R/M products include: Industrial Rubber • Fan Belts • Radiator Hose • Brake Linings • Brake Blocks • Clutch Facing Asbestos Textiles • Teflon Products • Packings • Sintered Metal Parts • Bowling Balls

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...to get those BETTER BUFFALO PATTERNS"

We never really meant to boast,
But foundry men who want the *most*,
Say Buffalo Patterns give you more,
Deliver plusses so galore.

Every job and each detail,
Is Engineered to never fail,
To give you patterns tailor-made,
For value much more than you paid.

Our equipments fit your shop,
And production schedules never drop,
No extra rigging will you do,
And with adapting you are through.

Fine Craftsmanship here you will find,
Scrap ratios hit that cellar line,
So if your foundry likes more dough,
Use these *better* patterns from Buffalo.

Be our guest Just let us know when you are coming to Buffalo on pattern business. One of our cars will meet you at your plane or train and transport you to our club where you will be our guest during your stay.

roduction and Experimental Pattern Equipment • hell Mold Pattern Equipment and Engineering • Wood nd Plastic Models • Jigs, Templates and Target Fix- res • Permanent Molds • Forging and Stamping Dies Dies for Injection and Reinforced Plastics Molding • pecial Precision Parts • Special Machinery and Tool- g • Metallizing • Engineering Drawing Service

BUFFALO PATTERN WORKS, INC.

832 HERTEL AVE., BUFFALO 16, N. Y.

DESIGNERS AND MANUFACTURERS OF PATTERN EQUIPMENT FOR OVER HALF A CENTURY

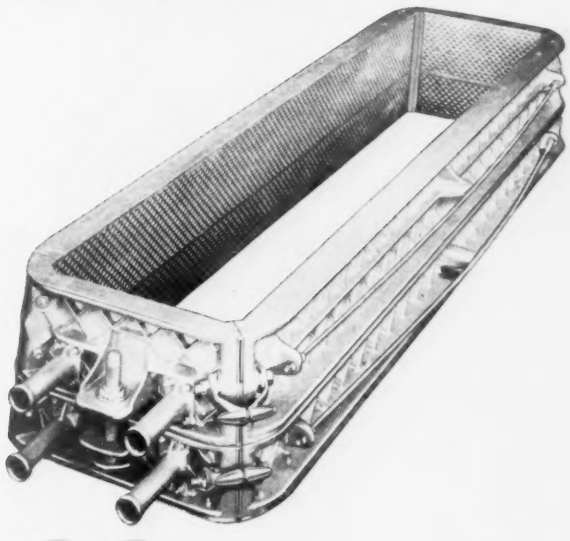
eco

nomy

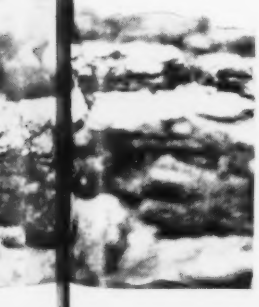
Despite his amusing gambols and antics, the squirrel can assume a serious mood at times. Particularly toward the end of autumn, when he practices sound *economy* by storing away a good portion of the acorns and nuts he finds, for the long winter ahead.

Foundries, too, can exercise prudent economy by making use of HINES "Pop-Off" FLASKS. For there's no other type of foundry equipment in which they can invest that will pay bigger dividends. HINES FLASKS contribute substantial savings by producing an unusually high percentage of perfect molds and, conversely, less scrap. This advantage, plus long service and trouble-free performance, is why so many foundries have turned to HINES for economy.

We'll be glad to have an opportunity to prove these statements for you. Contact your HINES representative or write direct.



The squirrel searches for seeds, fruits and other foods in the early morning or in the cooler hours of the afternoon. The hotter part of the day it spends in its nest high up in the fork of a lofty bough. In the fall it exhibits a true spirit of providence by gathering acorns and nuts and hiding them away in holes and crevices near the tree in which it dwells. In the winter, whenever the squirrel requires nourishment, even though snow be on the ground, it scratches away the snow and unerringly recovers its hidden treasures.



Hines

HINES POP-OFF FLASK **FLASKS**

THE HINES FLASK CO.

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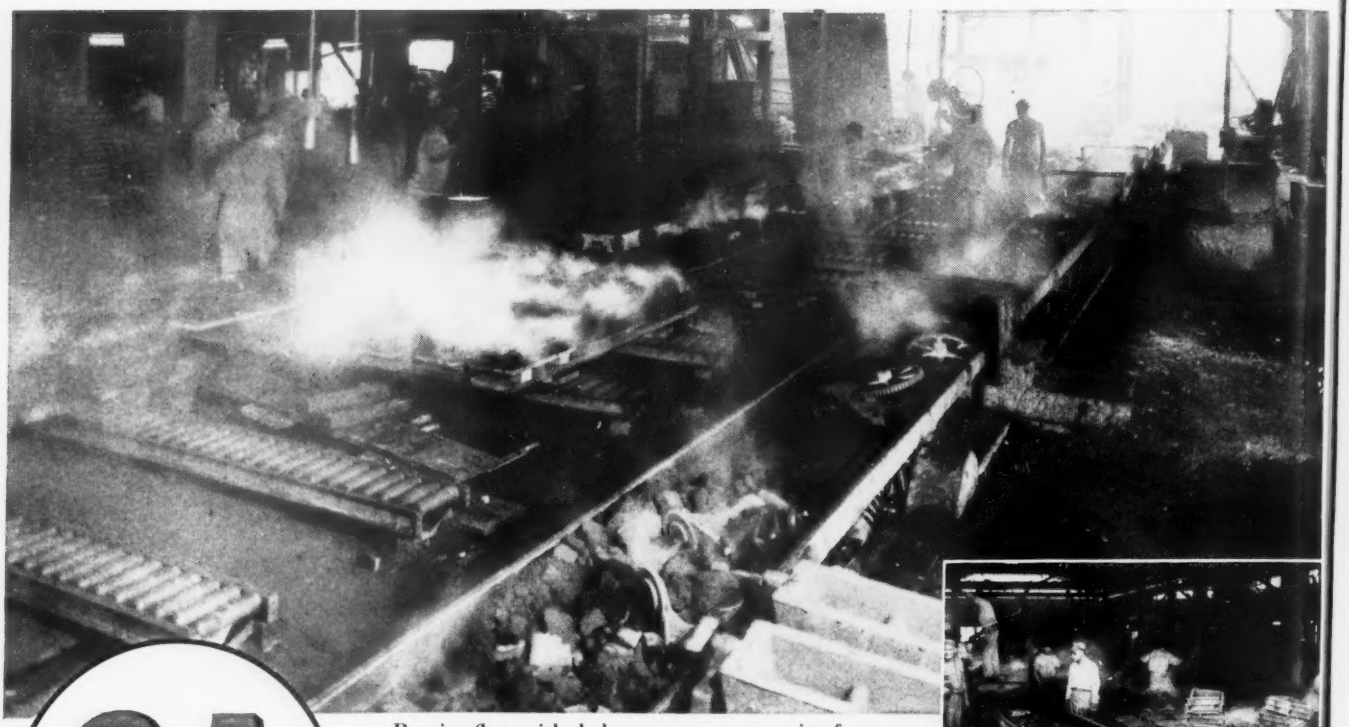
BUILT-IN "Shimmy" SHAKES DOWN COSTS



Pouring floor with shakeout conveyor running from foreground. Howell Foundry, Los Nietos, Calif.

Discharge end of conveyor, showing vibrating grizzly. Sand drops through grizzly into hopper.

S-A CONVEYING System

Vibrates Sand Off Red-Hot Castings

Designed for efficient, simplified handling, this shakeout system—unusual though it is—meets the typical objective of *all* S-A Systems: To do a particular job better and at continuous low cost.

Two S-A Natural Frequency Vibrating Conveyors run for 90 feet along this foundry pouring floor. They are loaded along their entire length within minutes after a pour—and the powerful force of natural frequency vibration goes to work.

As the molds are conveyed, 85 feet per minute, they break away and the sand is vibrated from the hot castings. At the end of their ride, a vibrating grizzly gives the castings a final jolt to break loose any remaining sand. Aided by the regeneration of power from the supporting coil spring, only a 5 HP motor is required for each 45′ x 30″ conveyor unit, handling molds as large as 22″ x 24″ x 18″ and castings weighing up to 100 lbs.

Perhaps this S-A System offers a clue to a handling problem you have. But *whatever your bulk handling need*, chances are S-A Engineers can show you a practical, economical answer. Write—and we'll arrange a free survey.

REDLER Conveyor-Elevators
ZIPPER Conveyor-Elevators
Vibrating Conveyors
Belt Conveyors
Screw Conveyors
Tellevell Bin Level Controls
Vibrating Screens
Bucket Elevators
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SEALMASTER Ball Bearing Units
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STEPHEN S-A DAMSON MFG. CO.
81 Ridgeway Avenue Aurora, Illinois
Los Angeles, Calif., Belleville, Ontario

DESIGNERS AND MANUFACTURERS OF ALL TYPES OF BULK MATERIALS HANDLING EQUIPMENT

The Singer Class 253 high-speed, two-thread, chain-stitch industrial sewing machine operates at speeds up to 5,500 stitches per minute. It is used by manufacturers of shirts, bathing suits, blankets, uniforms, coats, flags, etc.

SINGER

MEETS LOW POROSITY CASTING REQUIREMENT WITH CHATEAUGAY PIG IRON

Low porosity is an important requirement in the arm casting for the Class 253 industrial sewing machine manufactured by The Singer Manufacturing Company. The machine is equipped with a fully automatic lubrication system that pumps oil under pressure to principal bearings. The inside of the casting is constantly bathed in oil which would soak through a casting of higher porosity.

To get a dense, strong casting with low porosity and high wear resistance the Singer Company uses Chateaugay, Republic's exclusive premium Pig Iron in their cupola mixture. Chateaugay shrinks evenly, fills adjoining light and heavy sections completely, produces an unusually fine and uniform grain structure. Chateaugay castings machine readily and economically.

A Republic Pig Iron Metallurgist will be glad to give you the complete story on Chateaugay, the low phosphorus, copper-free Pig Iron. There's no cost or obligation for his services.

Let us know when you would like him to call.

REPUBLIC STEEL CORPORATION
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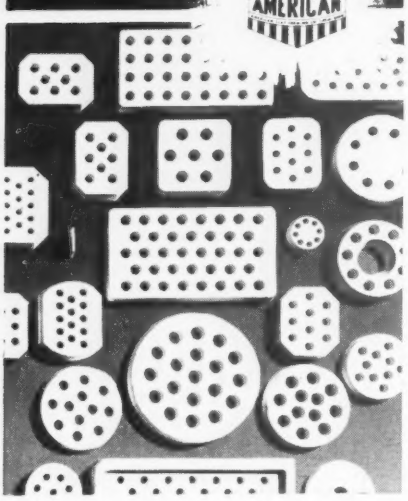
Republic PIG IRON

"CHATEAUGAY"	"REPUBLIC"	"PIONEER"
Low-Phosphorus, Copper-Free	(Northern) Foundry, Basic and Malleable	(Southern) Foundry and Basic

REPUBLIC STEEL

Fewer Rejects with AMERICAN CERAMIC STRAINER CORES



Here are just a few of the American Ceramic Core designs available

Rejected castings cost MONEY! That's why it will PAY you to investigate American Ceramic Strainer Cores for your foundry.

Made of high quality materials to withstand the shock of molten metal — American Cores remain round and uniform during the pouring operation — this assures you of a slag-free casting every time.

American will quote prices on any size or shape Strainer Core. Write today for samples and descriptive literature. There's no obligation, of course.

THE AMERICAN CLAY FORMING CO.
Tiffin, Ohio — Tyler, Texas
National Sales Representative
WILLISTON & COMPANY
DELTA, OHIO
Manufacturers of Specialized Refractories for over 30 Years.

Readers' Comment

The Gray Iron Anniversary

TO THE EDITORS:

Those of us close to the affairs of Gray Iron Founders' Society are very much gratified by the way the October issue of FOUNDRY has so handsomely recognized the Society's quarter century of progress.

On behalf of the officers, the board of directors, the members, and the headquarter staff, may I express our deep appreciation to the staff of FOUNDRY for such a splendid tribute to the Silver Anniversary year of our association.

H. J. TRENKAMP
President
Gray Iron Founders' Society
Cleveland 14

* * *

Hurts Appeal to Young Men

TO THE EDITORS:

"Can You Point with Pride" is quite sharp.

I never realized it so much before, but I am sure that the foundry industry has done itself much injury by the careless appearance of some foundry shops. And the harmful influence reaches not only customers but likewise smart young men who might be prevailed upon to get into the foundry industry if the appearance of many foundries were better. There is a slogan that the foundry is a good place to work, but your editorial may bring around some of the brethren who have not kept that kind of foundry premises.

DEAN C. J. FREUND
College of Engineering
University of Detroit
Detroit 21

* * *

More About the Cup, Etc.

TO THE EDITORS:

I have followed with some interest the occasional discussions of tricky castings and other examples of "government work," including the cup, saucer and spoon appearing in FOUNDRY. I have seen many of these castings. The majority have been of rather simple design and heavy section.

The accompanying illustration shows a thin-wall casting from my collection. This cup has a small trough on one edge to hold a cigar or cigaret, thus converting the unit into an ash tray. The job is not quite as simple as it sounds. The casting is made from a cup and saucer of the egg-shell class. The cup broke in the mold and was removed in two pieces. The spoon is very thin, with a raised floral design on the handle. The shank and bottom had to be thickened with modeling clay, otherwise the metal would not have filled them. This casting is aluminum.

During the entire time I was in the foundry, an experience covering several years and several shops, I have known few men with the necessary combination of patience and skill to produce a casting of this kind. Also, only a comparatively small number of molders can look at the casting and realize how the mold was parted. The ranks of the clever old all-around molders grow thinner as the years roll along.

JAMES W. PARK
Columbus Malleable Iron Co.
Columbus, O.

* * *

Careful Selection Is the Kev

TO THE EDITORS:

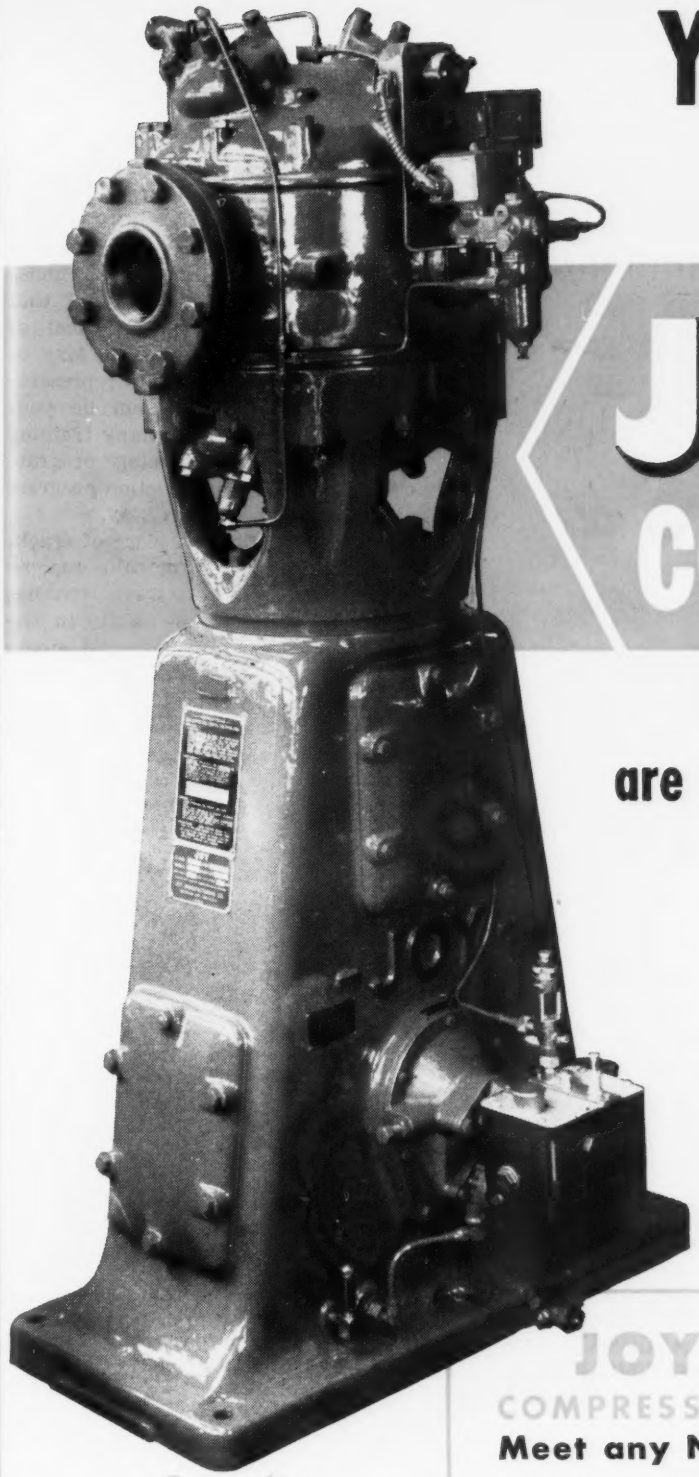
The following is my answer to "How To Train Apprentices" of your Reader's Comment of the September issue.

In defense of the apprentice method of training for the foundry industry, I would like to point out the most probable reason the gentleman, known as an ex-trainer, is an Ex-Trainer. I find in his remarks titled "How to Train Apprentices" in the September issue, no mention of any method of selection. Probably selecting young men for training is the most important single phase of any training function, and the lack of proper selection accounts for his failure.

Mr. Ex-Trainer mentions, "A certain number have no ambition to improve their condition. Some are temperamentally unfitted either through natural timidity or laziness—mental or physical—to occupy positions of responsibility." Men who fall into the above category should never be hired or started as apprentices.

I would suggest if you have a molder or coremaker apprentice course, then call it that and train the men to be good molders and coremakers.

(*Concluded on page* 96)



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JOY WG-9 COMPRESSOR

These Exclusive Features are worth Money to you!

Only the JOY WG-9, in its class, offers replaceable crosshead guides and cylinder liners, and full force-feed lubrication—features that will save you money in operating and maintenance costs. Unique truncated pistons and angled over-size "Dual-Cushion" valves assure higher valve capacity, better heat dissipation, lower air friction and elimination of valve pounding.

The WG-9 is a water cooled, double acting, single stage, heavy duty compressor for use where medium amounts of air are needed or for supplementary service in high air-requirement industries. Vertical design minimizes vibration and cuts required floor space. Foundation is but a simple concrete pad.

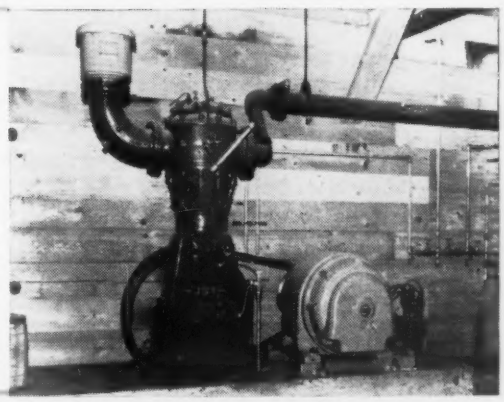
15 SIZES • 30 to 150 lbs. psi • 172 to 881 CFM

Consult a Joy Engineer

JOY COMPRESSORS

Meet any Need

High and low pressure compressors, oil free compressors, boosters and vacuum pumps—Joy builds a type and size for every need. • Let us handle *your* air-supply job.



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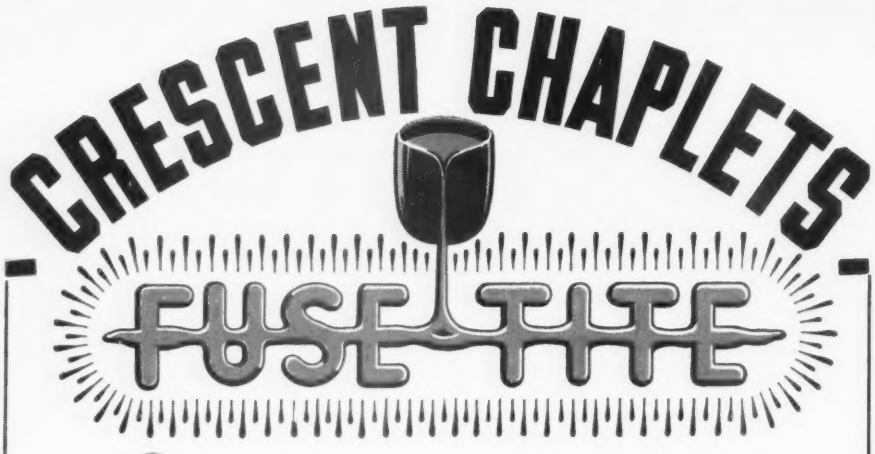

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We manufacture a complete line of all types and sizes of Foundry Chaplets, and all kinds of wire and metal formations for your foundry use. If we don't already make what YOU need, we'll design and develop just the CHAPLET to suit your requirements. Your inquiries and specifications are invited . . . . for quick service, write for working samples. As a few of our specialties:

- **RADIATOR CHAPLETS**
- **SHOULDER CHAPLETS**
- **BOILER CHAPLETS**
- **DOUBLE HEAD CHAPLETS**
- **MOTOR CHAPLETS**
  (Regular or Extended stems)
- **TIN TUBES**
  (Plain or Perforated)
- **FOUNDRY NAILS**
  (Plain, Nicked or Barbed)
- **SKIM GATES**
- **CORE WIRES**
- **CORE PLATES and SHIMS**
- **TAPER DRIVE PLUGS**

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(Concluded from page 94)

If you want foundrymen, men who know all phases of your foundry operation, then train them with that end in mind. Your worry of having "all colonels or masters" is not well founded; certainly keeping an employee ignorant or unskilled does not make him a better employee.

I agree 100 per cent with the closing paragraph of the article under discussion where you point out that "an attempt to instill technical or theoretical knowledge in the lazy or temperamentally unfitted represents wasted efforts." Therein lie your mistakes, the cause of many training failures. A good training program coupled with a good selection program will more than pay its way.

One doesn't finish a piece of cracked knotty jack pine for table top; no you select a piece of wood that has the characteristics you desire in the finished product. Select good stock, process it carefully and you can predict your product.

BURTON L. BEVIS
Education and Training Dept.
Caterpillar Tractor Co.
Peoria 8, Ill.

* * *

Should Be Required Reading

TO THE EDITORS:

After reading your lead editorial in the August issue of FOUNDRY, I cannot help but pause for a second to say—"Congratulations on an excellent job of editorial writing."

If every foundry salesman in the country today was required to read this editorial at least six times, the foundry industry would certainly be more profitable.

R. L. GILMORE
President
Superior Steel & Malleable Castings Co.
Benton Harbor, Mich.

* * *

A Bookbinder Objects

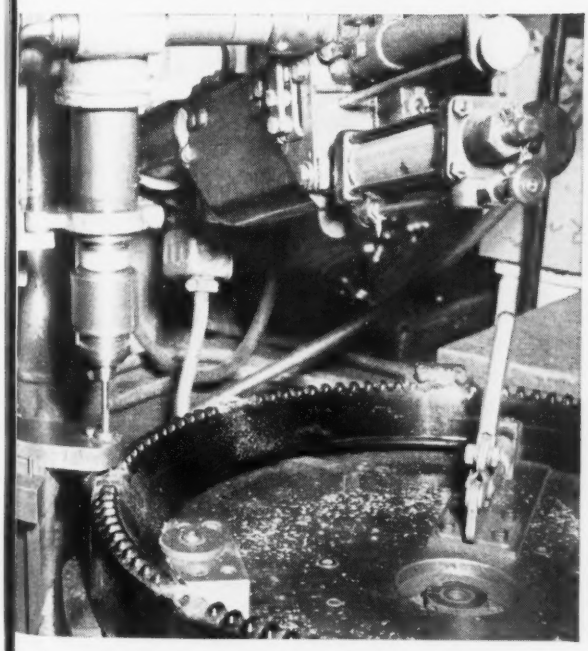
TO THE EDITORS:

You have a fine magazine in FOUNDRY and that it is well liked is evident in the number of these magazines sent to us to be bound into book form.

However, won't you take pity on us bookbinders and make your margins just a little wider. When the magazines are bound together they have to be trimmed around the edges and the finished book does not look well with a tiny little rim around the printed matter. If you could widen your margins it would be appreciated by bookbinders all over the country.

C. C. DE VICQ
Acme Bindery Inc.
Buffalo 3, N. Y.

HOTPOINT, INC., MAKE IMPORTANT SAVINGS
In "Controlled-Air-Power" Drilling & Tapping Operations



If you'd like a copy of the Foto Facts File describing this operation at HOTPOINT, INC., write The Bellows Co., Dept. FO-1153, Akron 9, Ohio. Ask for Foto Facts File FF-51-622.

Cuts labor cost from 33-6/10c to 7-3/10c each in drilling and tapping a heavy cast iron ring

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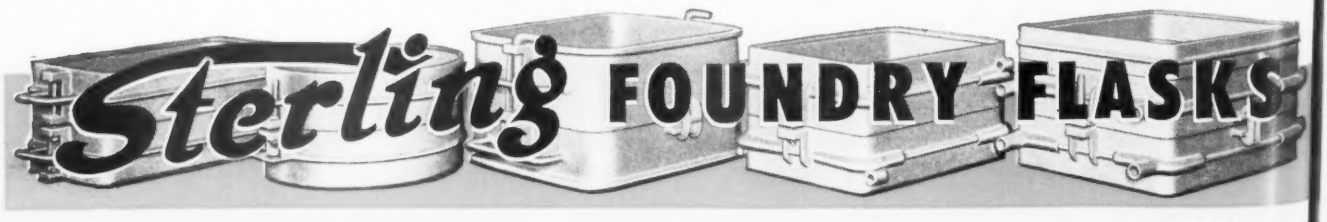


A7634-IPC

Industry Must Serve

During both World War II and the Korean War, the ferrous foundry industries worked hard and long to obtain greater recognition among government agencies handling emergency controls.

Since 1951, the Alloy Castings Institute, Gray Iron Founders' Society, Malleable Founders' Society and Steel Founders' Society of America, acting individually and co-operatively through the National Castings Council have insisted that production of castings for war and essential civilian needs could have been accelerated by providing an organizational set-up at the policy making level in the Iron & Steel Division of the National Production Authority. While success seemed near on several occasions, the authorization of such a move failed to materialize.

With the folding of NPA and the establishment of the Business and Defense Services Administration within the Department of Commerce to help industry and government prepare for any future emergency, a new day for ferrous castings seems to be developing. Reports from Washington reveal that the Iron & Steel Division of the BDSA will include a Ferrous Castings Branch. This is a more important and advantageous set-up than the castings section in the old NPA. Now representatives of the ferrous foundries will participate in the development of policies affecting those industries rather than hearing of plans after they have been frozen. Both government and the ferrous foundry industries will benefit.

While foundries should find great satisfaction in this development, it should be remembered that greater recognition of the basic character of castings in our economy brings increased responsibility for the ferrous foundry industries. Experienced foundry executives must be made available to government so that the new ferrous castings branch will function properly as long as world tensions require a "defense" organization.

Although it is probable that before this issue comes from the press a man will have been named to head the castings branch for the first six-months' period, the immediate problem is much more complex. To provide maximum service to government and industry, and at the same time be fair to those who are willing to undertake the Washington assignment, the ferrous foundry industries should lose no time in developing a plan that will provide men on a basis of six months' service for at least the next three years. It is interesting to note that the basic steel industry already has developed a plan and secured sufficient men to supply the needs of each of the iron and steel units for several years to come.

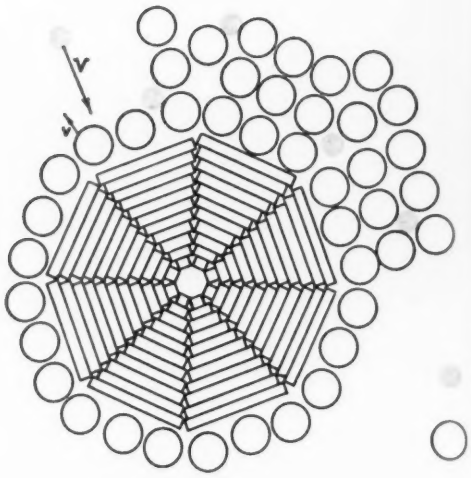
To develop such a plan for castings, each of the four trade associations listed above has named one representative to a Joint Personnel Committee. These men will canvass the situation and solicit the co-operation of companies producing iron and steel castings. If your company is asked to provide an executive for this government assignment, consider that you owe it to your government, your industry and your own organization to comply.

The success of the ferrous foundry industries in any future emergency will depend on how well they build in the months and years immediately ahead. Operation Washington is an important part of the foundry picture.

NOVEMBER 1953

Frank G. Steinebach
Editor

Graphite Spherulite Formation and Growt



The author presents a tentative complete theory plus experimental results which give accurate details on the mechanism of spherulite formation and growth during the production of nodular graphite iron

By ALBERT DE SY
Professor of Metallurgy
University of Ghent
Belgium

IN TWO recent papers by A. De Sy and R. Collette[1] and by A. De Sy and J. Vidts[2], the authors attempted to give a complete but still tentative theory on spherulite formation in cast iron.

In the first of these papers they demonstrate, as already announced by J. E. Rehder[3], that graphite spherulites are metastable and break up into flakes when regular nodular iron is heated for an extended period of time at temperatures below but near the solidus.

In the same experiments the authors obtained, as a result of recrystallization, almost identical graphite structures as those observed in very heavy nodular iron castings and they conclude that the latter may result from a self-annealing effect.

In their very suggestive paper, at the end of which they ask for discussion, F. H. Buttner, H. F. Taylor and John Wulff[4] conclude that, beginning with a certain unknown value of the specific interfacial energy at liquid-graphite interface, the graphite must precipitate in the spherical form because it is the lower energy shape.

This conclusion is naturally right; moreover, the fact that spheroidal crystallization in other systems seems related to interfacial energy constitutes an analogy argument.

However, it appears very doubtful that spherulitic graphite crystallization occurs as a result of sufficient high value of the specific energy at the liquid-graphite interface. In one of their experiments the authors state that a pure Fe-Si-C alloy was non-wetting just as was the nodular iron and we believe that freezing of the first should not give spherulites but flakes (unless it was very highly superheated in a basic crucible).

Referring to the same paper for the significance of the thermodynamical symbols and using the same for greater facility, the condition for spherulitic graphite crystallization in the melt may be expressed as follows:

$$\Delta F_{\text{dislocation}} < \gamma_{l\text{-}g} \, (A_{\text{flake}} - A_{\text{sphere}}) \qquad (1)$$

As a result of our experiments and those of J. E. Rehder[3] it now appears that, immediately below the solidus, one has:

$$\Delta F_{\text{dislocation}} > \gamma_{s\text{-}g} \, (A_{\text{flake}} - A_{\text{sphere}}) \qquad (2)$$

because the spherulites break up in flakes if heating time and temperature are sufficient.

Should it now be possible that, by passing from just below the solidus to just above, the value of the specific energy at metal-graphite interface increases sufficiently to invert inequality (2) and thus satisfy inequality (1); this appears difficult to believe and one should rather expect the contrary.

In conclusion, and unless the reverse is proved

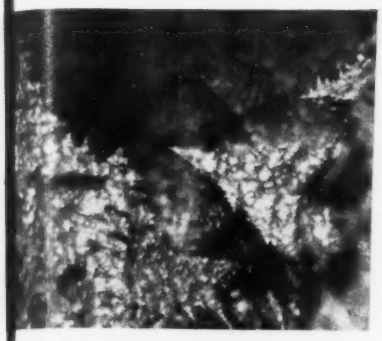
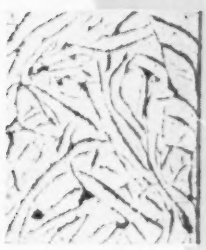


Fig. 2—Macroscopic dendrites in shrinkage cavity of definitely hypereutectic nodular iron (3.74 C, 2.14 Si, 0.07 P, 0.80 Mn, 0.82 Cu, 0.01 S, 0.045 Mg)



Left, Fig. 1—Mechanism of graphite spherulite growth on austenite (schematical). V = rate of C diffusion; v = rate of Fe self-diffusion, and where V > v

Right, Fig. 3—C distribution in some slowly cooled hypereutectic irons showing a layer of kish graphite upon the upper surface

one should admit that the spherulite is a metastable graphite form.

If, notwithstanding, the spherulite originates in the liquid as often admitted, it is probably not as a result of the value of the specific interfacial energy at liquid-graphite interface, but for some other reason as: growth inhibition, oriented overgrowth or something else.

However, it appears probable that the spherulite originates and grows in supersaturated austenite according to a hypothesis already put forward by the author[5] in 1950 and supported by A. Wittmoser[6] in 1951.

The regular spherulitic crystal growth appears only possible in a single phase or at least in an environment that is isotropic towards diffusion phenomena.

To illustrate this principle it may be interesting to give a detailed description of the graphite spherulite growth in supersaturated austenite as this result from the hypothesis mentioned here above. The growth of such a spherulite is schematically illustrated by Fig. 1.

At any state whatever during the graphite crystal growth the shape of the outer surface is controlled by the speed of evacuation of the iron atoms enveloping the graphite particle.

Indeed, in building up the graphite crystal, both phenomena—the withdrawing of the iron atoms and their replacement by carbon atoms—are necessary; on the other hand, it is well known that the iron self-diffusion rate is very much lower then the carbon diffusion rate so that the former phenomenon necessarily controls the shape of the graphite particle surface.

If, in the immediate vicinity of the growing graphite crystal, the solution is sufficiently homogeneous, as may be accepted for a single phase as austenite, the rate of iron self-diffusion is the same in all directions and the hole resulting from the withdrawing or moving away Fe atoms and filled up with C atoms affects a spheroidal shape. A similar description of the growing mechanism of graphite spherulites has been given by K. P. Bunin and G. I. Ivantsov (abstract by A. G. Guy, *Metal Progress,* Dec., 1951).

According to the foregoing principle governing spheroidal crystal growth in homogeneous environment we should remember that the liquid solution is also isotropic and consequently spheroidal growth is not excluded a priori.

However, in the liquid the crystal shape will not be controlled by the moving away of the iron atoms but by the arriving of the carbon atoms, and the graphite crystal will grow according to his crystal habit with preferential growth parallel to the basal plane; a flake will result as normally.

Precipitation in the Liquid—But, coming back

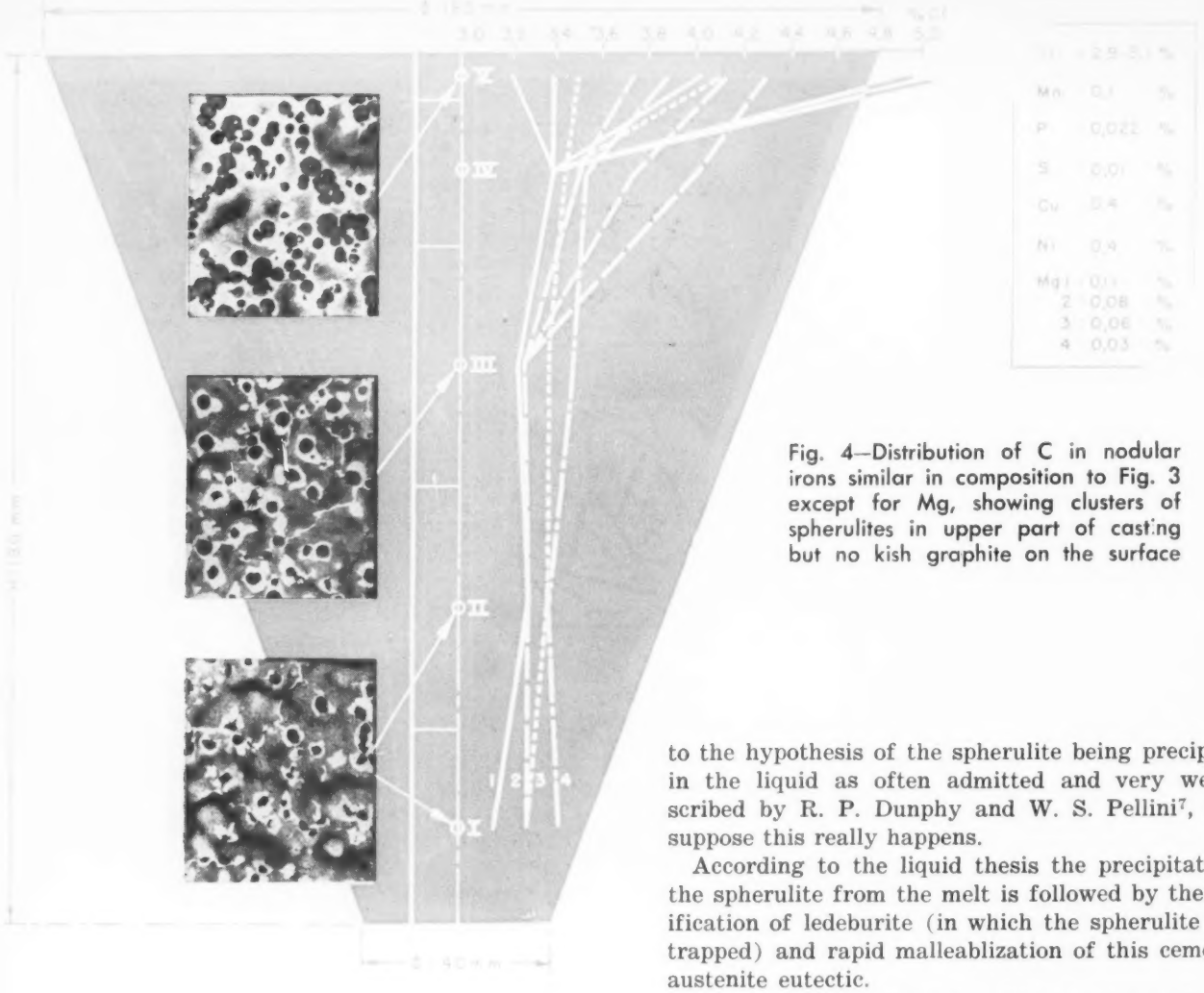


Fig. 4—Distribution of C in nodular irons similar in composition to Fig. 3 except for Mg, showing clusters of spherulites in upper part of casting but no kish graphite on the surface

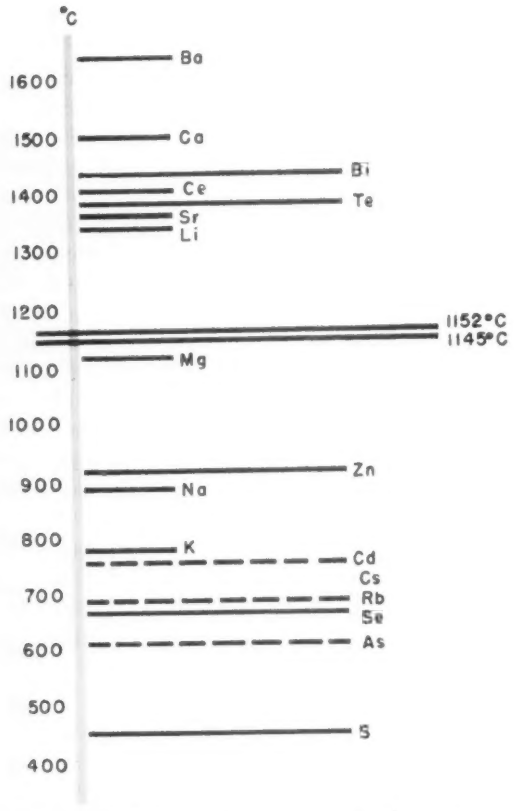


Fig. 5—Boiling temperatures of elements capable of producing nodular iron, or at least some spherulites (so far, except As, Rb, Cs and Cd)

to the hypothesis of the spherulite being precipitated in the liquid as often admitted and very well described by R. P. Dunphy and W. S. Pellini[7], let us suppose this really happens.

According to the liquid thesis the precipitation of the spherulite from the melt is followed by the solidification of ledeburite (in which the spherulite is entrapped) and rapid malleablization of this cementite-austenite eutectic.

At the moment the spherulite is entrapped in the solid eutectic and graphitization starts, the (even initially perfect) spherulite must grow further in contact with two phases—cementite and austenite.

If one admits that, at an early stage, the decomposition of the ledeburite layer gives way to a perfect uninterrupted graphite surrounding austenite layer, then further growth of the graphite particle would occur in austenite and the spheroidal graphite shape appears the one we should expect. On the other hand, it is well known that all the spherulites are born in a very short period corresponding to the beginning of the so-called "eutectic arrest."

If the graphite spherulites precipitate directly from the melt, there seems to be no reason why this precipitation should not continue until the last liquid is solidified. Indeed, the carbon withdrawing from the melt through graphite precipitation—if this really happened at the beginning—should continue instead of the more complicated indirect withdrawing by diffusion from the liquid through the surrounding and growing austenite layer to the initially precipitated spherulites.

Thesis Appears Plausible—The thesis of the spherulite genesis and growth in supersaturated austenite not only appears plausible but permits satisfactory explanation and interpretation of numerous phenomena very specific to nodular iron, among which the most important are: Supercooling and the shape of the cooling curves; important shrinkage; the "nodule count" of Dunphy and Pellini[7]; sharp segregation

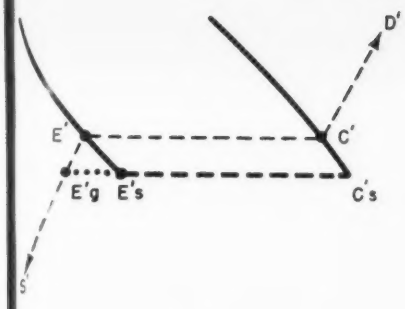


Fig. 6—Tentative diagram depicting solidification of nodular iron. E'C'D' = stable equilibrium system (flake graphite). E'g, E's, C's = peritectic solidification of gray nodular cast iron

boundaries enveloping cellular zones, etc.

However, as some of the above-mentioned phenomena may also be explained by the liquid theory, three more facts will be added:

1. In a shrinkage cavity of a definitely hypereutectic nodular iron, we observed well formed macroscopic dendrites (Fig.2).

The composition of a small dendrite itself was checked and found almost identical to that of the casting. Does a eutectic form dendrites? We don't believe it does; sometimes small dendrites of one of the phases but never dendrites of the eutectic itself. Therefore, and for many other reasons, it is believed that nodular iron solidifies without eutectic but in a mixed crystals system, forming supersaturated austenite in which graphite precipitation occurs, beginning at a certain degree of supersaturation, and spherulitic graphite growth follows by a peritectic transformation or reaction.

2. Magnesium-treated highly hypereutectic nodular iron does not reject kish (spherulitic) graphite.

Experiments for the purpose of obtaining kish graphite on the upper surface of ordinary and nodular iron castings with a carbon equivalent of approximately 5 have shown that the ordinary hypereutectic irons rejected evidently fairly large quantities of kish graphite. On the other hand, the nodular irons, although showing definite spherulite flotation in the upper zone, never gave evidence of spherulitic kish graphite (notwithstanding the fact that the spheroidal shape is, according to Stokes' law, the ideal one for complete rejection).

In all those experiments with identical charge and treatment (except Mg of course) for the ordinary and the nodular iron aiming at a carbon equivalent of approximately 5, special precautions were taken to obtain perfectly directed solidification (the castings had the shape shown in Figs. 3 and 4, and the upper surface was insulated with an electrically heated refractory block 10 mm away from the metal surface).

The results of two experimental series are gathered in the diagrams Figs. 3 and 4, respectively, for ordinary and for nodular irons. The flotation of the spherulites assembled in bunches in the upper layer of the casting appears distinctly in the micrograph Fig. 4 and is evidently verified by the scattering of the analyzed carbon in that layer.

These results are difficult to explain by the thesis of nodule genesis and growth in the liquid. Indeed why shouldn't the spherulites float right to the surface as do flakes in identical experimental conditions? On the contrary, the assembled spherulites as shown in Fig. 4 and the absence of spherulitic kish graphite are easy to explain by the flotation of the first precipitated small austenite crystals lightened by the contained spherulites which must have precipitated almost immediately because of the high degree of supersaturation of the first austenite crystals; this high degree of supersaturation must be considered according to the tentative diagram Fig. 6.

For gray nodular iron the tentative diagram shows the evolution of the liquid phase along $C'C'_s$ corresponding to the precipitation of austenite crystals moving on $E'E'_s$, when the austenite crystals become supersaturated (a concentration to the right of point E') precipitation of graphite starts within the austenite; in the immediate vicinity of the first graphite particle the equilibrium carbon content of austenite is so much lower (a point on $E'S'$) than that of the last deposited solid layer and the rate of diffusion is so high that the spherulite grows very rapidly. Quench experiments show that, once the spherulite appears, it has already a diameter of several microns, and this demonstrates that, at least in the first stage, it grows very rapidly.

During the growth of the graphite spherulite a carbon concentration gradient does exist in the austenite crystal; this is the driving force for the graphitization according to a transformation quite similar to the peritectic reaction.

In the immediate vicinity of the spherulite the C per cent is close to the austenite-graphite equilibrium ($E'g$) and on the solid-liquid interface the C per cent is close to the austenite-liquid equilibrium ($E's$).

Carbon Is Continually Withdrawn

This carbon is continually withdrawn from the austenite solution and replaced at the expense of the carbon of the melt; this corresponds to a carbon migration from the liquid through the austenite surface layer to the graphite spherulite.

The rate of carbon diffusion in the melt is higher than in the solid austenite and, in order to satisfy equilibrium conditions, the rate of carbon pickup of the austenite crystal will be at least equal to the carbon withdrawal from the surface to the graphite spherulite.

During the graphitization the austenite crystal still keeps growing; this means that the distance from the solid-liquid interface to the graphite spherulite becomes greater. It thus may happen that the carbon withdrawal within the austenite crystal does not follow the carbon pickup from the liquid; the supersaturated layer may become thicker and thicker; at the time a new graphite crystal may start, of course, near the surface; the new formed spherulite will dispute and consequently delimit the influence zone of the first one.

3. Malleablization of white iron and white Mg-treated iron.

In the malleablization of white iron graphitization starts at the curved surface of a cementite plate; austenite in contact with this very first graphite particle gives up carbon (the difference between metastable and stable equilib- *(Please turn to page 210)*

LARGE WOOD

patternmaking

By M. J. KELLNER and G. H. GORSUCH
Feeder and Service Division
Westinghouse Electric Corp.
Trafford, Pa.

WOOD has been the patternmaker's main medium since the beginning of the profession and it is not likely that it will soon be replaced. This monopoly has been largely substantiated by the comparative economy of wood, its workability and its strength for weight.

The making of castings for a diversified industry requires the production of many different types of patterns. Patterns are produced of hard or soft wood for bench, flask, and pit molding from which castings weighing a few ounces up to 90 tons are made. Furthermore, they are made for almost every cast material used by industry. Coreboxes are also made for practically every method of coremaking devised, using both green sand and dry sand.

Everybody concerned in the construction of patterns must, of course, have the same information as to the type of pattern required. The type of pattern is determined almost entirely by information furnished by the engineering department ordering the pattern. This information consists of castings required on the first order, the anticipated monthly or yearly activity and, in some cases, the number of active years expected.

Classes of Patterns—To classify this information in a simple and concise manner, each pattern is delegated to one of five classes:

1. Temporary pattern to be scrapped after use. This type of pattern is made as cheaply as possible and is usually used for experimental or development purposes, or to replace parts of tools or machines and not expected to be used again.

2. Low activity and short life. This type is usually a loose wood pattern with the future requirements small and design expected to be changed or discontinued in the near future.

3. High activity and short life. This type of pattern is usually a soft wood pattern mounted for machine molding to supply a relatively large number of castings on the initial order with little or no future activity anticipated.

4. Low activity and long life. This type of pattern is usually a hard wood pattern with high wearing areas trimmed in metal, mounted for machine molding. Some designs require the making of metal patterns in this class.

5. High activity and long life. This type of pattern is made entirely of metal and is designed for high production requirements. All coreboxes are built for core blowing machines and core driers are supplied if needed.

With the above information known and recorded, the ordering of pattern equipment and the specifying of the type of contruction is simplified. Also, future information on types of patterns available when reordering castings is easily obtained.

Scale Model Useful—The ultimate in wood patternmaking is the construction of the large pit pattern. Many of these require from three to five thousand hours of labor and from five to ten thousand board feet of lumber. As a preliminary step to the construction of large patterns, we have found a scale model of the casting to be a profitable introduction. Designers and builders have the opportunity to view the casting in three dimen- (*Please turn to page* 282)

Condenser cover pattern is painted with a special lacquer which will resist adhesion of molding sand

Right—Scale models such as shown here help in the design, layout and construction of large patterns

Literally thousands of man-hours and board feet of lumber go into this pattern for a turbine cover part

M. Muguet, president, Association Technique de Fonderie, speaking at opening session of the Congress. Andre Marie, French Minister of National Education, presided

INTERNATIONAL FOUNDRY

Attracts Foundrymen from 23 Nations

Speaking on behalf of all foreign foundry associations, L. N. Shannon, president, International Committee, addresses opening session of the International Foundry Congress at La Sorbonne in Paris

THE NAME "La Sorbonne" evokes the early middle ages, when a canon of Paris, Robert de Sorbon, who became chaplain of Saint Louis, King of France, founded in the year 1253, with the aid of the king, a college where 16 students of theology, who could not afford to pay the price of education, were given a roof, and food for the body and mind.

This institution developed into the University of Paris, which, under Cardinal Richelieu, became a center of learning attracting students from the world over. Part of the original building is still in existence and the tomb of Cardinal Richelieu is enshrined in the chapel which is the centerpiece of the present buildings.

The grand amphitheater of La Sorbonne, where so many eminent personages have presided or lectured on important occasions, was the site of the formal opening of the International Foundry Congress, which was held in Paris from Sept. 21 to 26. The chair was occupied by Minister of National Education Andre Marie, past premier of France, supported by Paul Muguet, president of the Association Technique de Fonderie, host to the Congress, and Lester N. Shannon, president of the International Committee of Foundry Technical Associations, past president of the American Foundrymen's Society, and vice president of Stockham Valves & Fittings, Inc., Birmingham. On each side of the long table on the platform were the leaders of foreign delegations, and seated behind were many

American delegates to the Congress included: Front row—I. R. Wagner, immediate past president, AFS; L. N. Shannon, AFS past president; Collins L. Carter, AFS president. Back row—W. W. Maloney, AFS secretary-treasurer; Vincent Delport, AFS European representative; W. L. Seelbach, past president, AFS

ONGRESS

By VINCENT DELPORT
European Manager
FOUNDRY

notabilities from the foundry world of many nations. Over 1000 members of the foundry associations of France and 22 other nations were present. Outstanding was the delegation from the United States numbering about 160 foundrymen and their wives.

About 70 papers, including a dozen official exchange papers, were presented in the course of 15 technical sessions. A number of foundries in the vicinity of Paris were open for inspection, especially for the benefit of American visitors who could not take part in the organized postconvention tours. There were also a number of social activities, some of which were specially arranged for the ladies.

President Paul Muguet was the first to speak at the official opening session. After extending greetings to the foreign visitors, he recalled the origins of the French association. The late Eugene Ronceray had attended the convention of the American Foundrymen's Association in Philadelphia in 1908, and he was impressed by the co-operative spirit that existed among American foundrymen through their association. He reported his impressions to his colleagues, and eventually the French association was founded, and officially recognized in 1911. Its first convention was in 1913.

In 1921 a joint congress was held in Liege with the Belgian association. In 1923 a congress, already of international character, was held in Paris, followed by two others in 1927 and 1932. In 1937 the association was, for the first time, host to a world congress under the auspices of the international Committee of Foundry Technical Associations.

President Muguet referred to the ancient origin of the foundry industry, and mentioned a recent discovery made, while bringing to light a Gaul tomb in the upper region of the Seine river, of a splendid vase in bronze of Greek origin, weighing nearly 400 pounds, and claimed to have been cast 25 centuries ago.

The French association had organized a comprehensive program, and President Muguet emphasized the co-operation given by the Syndicat General des Fondeurs de France, the Centre Technique des Industries de la Fonderie, and the Council of the Ecole Superieure de Fonderie, from which had graduated the immediate past president of the Institute of British Foundrymen, Dr. C. Dadswell, John Sissener, president of the Norwegian association, and two official

A visit to the Chateau de Dampierre, where special entertainment was arranged, was part of the social activities arranged for delegates to the Congress

delegates, one from Denmark and one from Sweden. The president also mentioned another organization, the Association Amicale et Mutuelle de Fonderie, founded many years ago to assist, financially and otherwise, young men who wish to start their career in the foundry industry.

M. Belier (right), French Ministry of Commerce and Industry, presents the gold medal of honor of the ATF to L. N. Shannon. At right is replica statuette of the International Committee Award of Honor presented by Mr. Shannon to Prof. Albert Portevin

Contacts with foreign associations and societies is kept through the Association Technique de Fonderie, which was one of the founder members of the International Committee.

President Muguet thanked all those who had contributed to the team work in the preparation of the Congress, and conveyed the respects of the meeting to Vincent Auriol, president of the French Republic; to Andre Marie, minister of national education, and to the other ministers and officials who had given their patronage to the Congress. He conveyed his special greetings to Mr. Shannon, president of the International Committee; to AFS President Collins Carter and to the official delegates of the ten other associations which form its membership; and to the representatives from the other nations.

Mr. Shannon replied on behalf of all foreign technical associations. He conveyed his thanks to President Muguet, his colleagues and committees for arranging an outstanding program, and extended hearty congratulations for the excellence of the organization in the face of great difficulties. He also thanked the many authors for their contribution to our knowledge of foundry practice. He said that the visitors from many countries had come in a spirit of industrial co-operation on an international scale, and, addressing himself to the foundrymen of France, he said, "Your hands have clasped ours as foundryman to foundryman . . . and we are grateful."

He then referred to the many points of similarity which exist in the common pursuit of the casting of metals in every country, and he said: "Our craft and our common skills and experiences can be the means of helping us remove the artificial barriers which today cause many peoples to look with suspicion on the motives of others. It was toward this goal that the International Committee of Foundry Technical Asso-

This group of visitors includes, front row right: L. N. Shannon, president, and Achille Brizon, vice president, the International Committee. Tom Makemson, honorary secretary and treasurer, is fifth from left; W. W. Maloney, AFS secretary, far left

ciations was established . . . and with the help of God and men of good will, that goal is not beyond our realization."

"To meet and to think and talk and learn together . . . to learn to know and understand each other better . . . these are the real benefits and priceless values that we gain by assembling here together."

President Shannon, as a past president of the American Foundrymen's Society, conveyed to President Muguet a verbal resolution from the society's board of directors, extending the hand of fellowship and sincere best wishes for a great congress. He mentioned the attendance of over 150 foundrymen and ladies from the United States and Canada, including the president of the society, Collins L. Carter, five past presidents, eight national directors—past or present, and the national secretary-treasurer, William W. Maloney.

In conclusion, President Shannon expressed his deep appreciation of the honor bestowed upon him in being selected to serve as president of the International Committee and on behalf of all members of the International Committee, he extended to President Muguet their most cordial greetings and their deepest appreciation for the efforts and friendship of the French association.

A. Le Thomas, director of the Centre Technique des Industries de la Fonderie, followed with a description of the origin and activities of the Centre. He paid tribute to Pierre Ricard, president of the Centre and honorary president of the Association Technique, who was unable to be present because of illness. Mr. Ricard, said Mr. Le. Thomas, had been the moving spirit and animator of the Centre Technique, and he was continuing to devote his energy to the further development of the organization, despite his many other activities. The success of the Centre was largely due to him.

Mr. Olivier, president of the Syndicat General des Fondeurs de France, described the organization of this association, which comprises ten sections according to the various fields of the foundry industry and ten regional sections, all working together. Through this association, said Mr. Olivier, the French foundrymen make one large family, including management, technicians and operatives. The industry employs 100,000 workers in about 2000 foundries, and the annual turnover is valued at $430,000,000.

Then Minister Andre Marie, in declaring the congress open, confirmed the sympathy of his government with the desire to further the well being of the industry, nationally and internationally. He said that the foundry industry in France has done pioneer work in bringing co-operation among all members of an industry. He expressed the thought that it is necessary to strengthen the liaison between national education and the life of the country, and it is his aim to take care of young students, not only during their studies but also in getting them into a job. In the government plans to reform education, considerable thought is given to the problem of "orientation" of young people toward their future livelihood.

Professor Paul Bastien, past president of the Association Technique de Fonderie, inaugurated the technical activities of the Congress by delivering a lecture on "Hydrogen in Cast Iron—A Comparison with Steel."

The technical sessions and works visits which had been arranged throughout the week were well attended.

Tuesday, Sept. 22, was devoted to the subject of education and training of foundrymen. This session was presided over by M. Buisson, director of technical education at the (*Please turn to page* 267)

Three ladles were used to pour the huge casting

Finishing the mold prior to setting the cores

185-TON CASTING *is Britain's Largest*

ENGLISH STEEL Corp. Ltd., Sheffield, recently shipped to the United States the largest steel casting ever made in Great Britain or the Commonwealth.

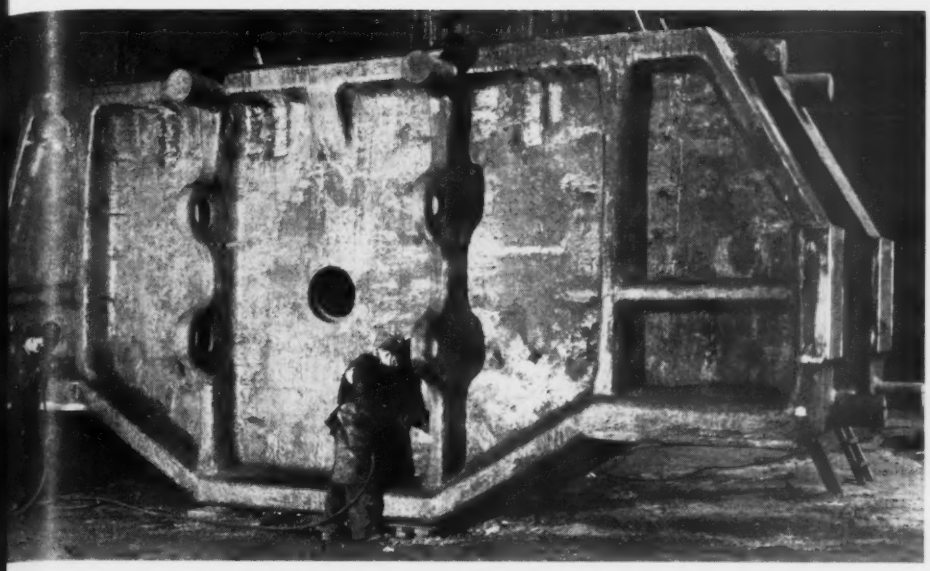
One of a series being incorporated in a 35,000-ton forging press for the American defense program, it is 26½ ft long, 13½ ft deep, 8½ ft wide and weighs 185 tons.

To cast this heavyweight, a pit 18 x 32 ft and 12 ft deep was required and over 500 tons of sand was used.

On account of its bulk and to facilitate its removal from the mold, the pattern was divided into five sections in which no less than ten standards of timber had been used.

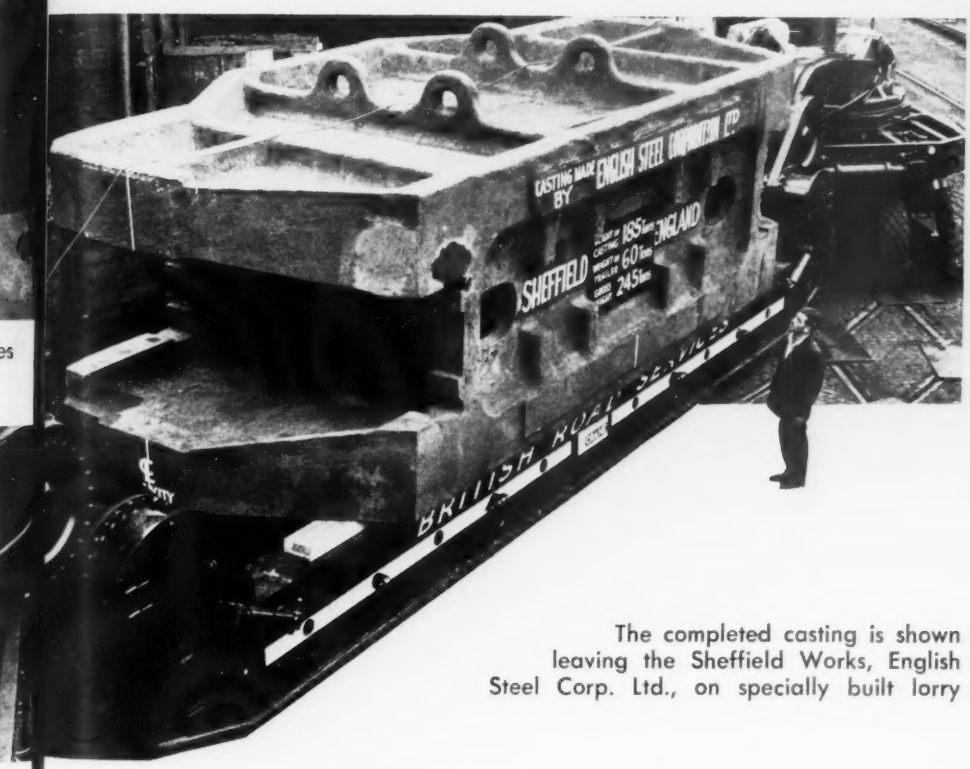
The facing sand mentioned was "molders' composition" made from "chamotte". Molding and closing required 1300 hours and the placing of 30 cores took 900 hours. It took three weeks to dry out the mold with eight portable stoves that consumed 30 tons of coke.

In casting, 232 tons liquid steel was used from three acid open-hearth furnaces, having a total capacity of approximately 200 tons, and two electric arc furnaces. For pouring, three ladles each of 60-70 tons capacity from the open-hearth furnaces were used. one at either end suspended from cranes and using



Pneumatic chipping operations during cleaning of the casting

A 200-ton floating crane was used for transferring the casting from special lorry at Liverpool to the United States Lines' steamship, the *American Packer*



The completed casting is shown leaving the Sheffield Works, English Steel Corp. Ltd., on specially built lorry

launders, and one in the middle supported on a stand. The ten heads, each 42 in. high and 26 in. diam, were finally topped up with steel from the two electric arc furnaces.

Three weeks elapsed before the heads were burned off and a further week before an attempt was made to lift the casting, using special jacks.

In annealing, a gas-fired pit furnace 15 x 30 ft and 13½ ft deep was used for a cycle of heat treatment lasting approximately four weeks.

The transport of this great load from Sheffield to its port of shipment, Liverpool, was carried out on a specially build 24-wheel lorry, said to be the largest in the world. The weight of the lorry alone, without its four 200-hp tractors, is about 60 tons, and the total load of 245 tons is the heaviest British roads have been called upon to bear. The overall length of the vehicle with the tractors was 150 ft, and each of the trailer's 12 pairs of wheels can be steered.

The journey to the port, taking about four days at an average of 25 miles per day, had to be specially plotted in conjunction with the Ministry of Transport.

The casting was transported from Liverpool to the U.S.A. by United States Lines on the *American Packer*.

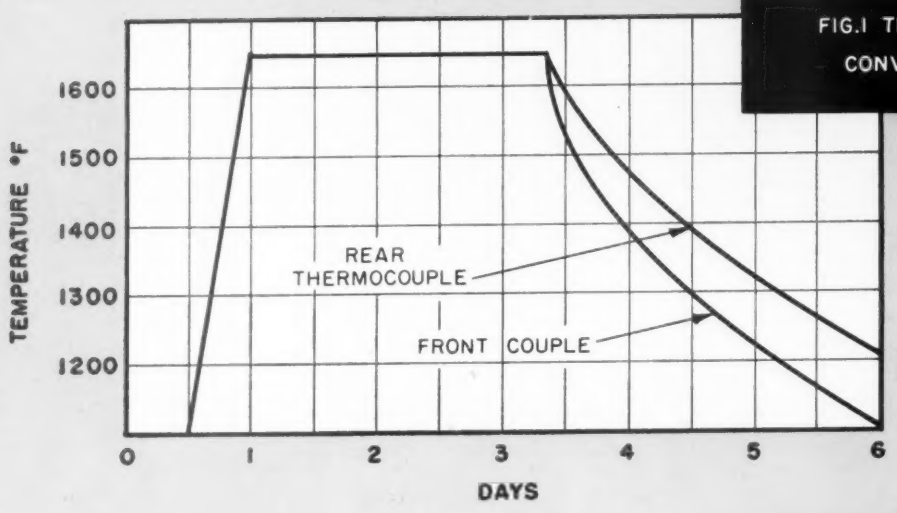


FIG.1 TIME-TEMPERATURE CURVE
CONVENTIONAL POT ANNEAL

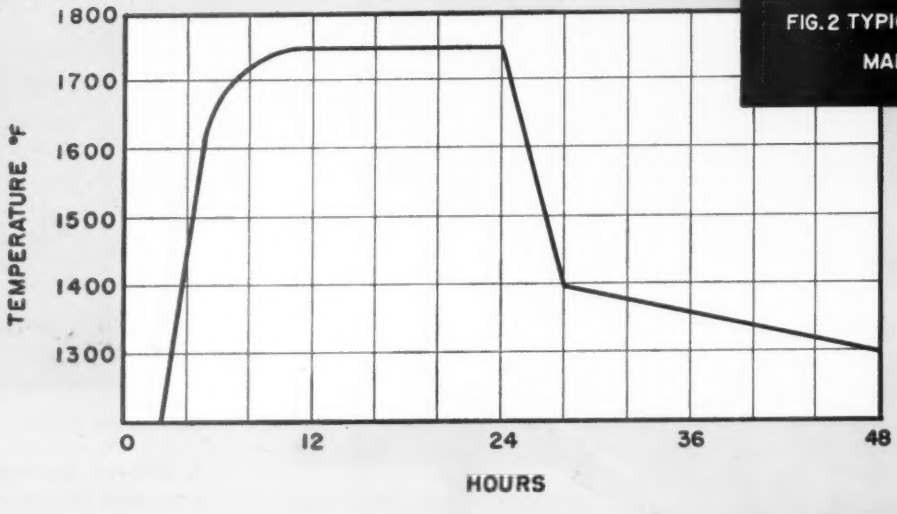


FIG.2 TYPICAL TIME-TEMPERATURE CURV
MANUFACTURER'S DATA

FIG.3 TIME-TEMPERATURE CURVE.VE
SLOW COOLING THROUGH TRANSFORMATI

ELECTRIC ANNEALING O

WITH SUFFICIENTLY close control, it is possible to observe the leveling off of the load temperature curve as a small compact batch of white iron castings passes through the transformation range. Since second-stage annealing is faster in the transformation range, the longer the temperature can be made to dwell therein, the better the results.

Eight-ton elevator-type electric ovens, using a two-cycle operation, offer such control, thereby permitting a superior second-stage anneal of a conventional analysis white iron in a 48-hour cycle. The findings should be equally applicable to small closely-controlled batches heated by other means, such as bell-type gas-fired ovens. In continuous ovens, however heated, we would be dealing with still smaller masses so that it would be interesting to see what results could be obtained.

For many years the conventional method of malleablizing was to pack the white iron castings in pots with, or without, some inert packing material like gravel. The pots were heavy sections of gray (or mottled) iron so that it was necessary to heat a stack of pots weighing perhaps 2500 pounds, total, in order to anneal therein 1000 pounds of castings. The ovens usually were big, holding more or less than 20 tons of castings, so that the masses being dealt with were quite large (50 tons for a 20-ton oven).

Annealing took place in two stages (as it still does), the end product of the high temperature first stage being temper carbon and austenite (iron carbide dissolved in gamma iron). The annealing process cannot be completed above the transformation range ("critical point") so that a second stage of annealing is required.

In the second stage, subcritical annealing is possible—the pearlite breaking down into ferrite and graphite—but the reaction is so much faster if the ferrite and graphite are formed from austenite, between the A_1 stable and the A_1 metastable, that it is preferable to hold in this range. The commercial method has been to cool slowly through the range. With the large masses, the slow cooling was best accomplished by sealing the oven and cooling as slowly as possible (without refiring) from the high heat down to some such temperature as 1200 to 1300° F.

There were temperature differentials between the front and back thermocouples, and not so obvious differences from the bottom to the top of the mass, so that at various locations in the oven the castings were going through the transformation at different times. We do not remember ever seeing a level line on the time-temperature chart during the second stage of annealing. The greater mass of pots could pass through the critical at different temperatures and so mask the effect, even though the load of castings was at a more uniform temperature. A typical time-temperature cycle for conventional annealing is shown in Fig. 1.

Small Ovens Offer Closer Control — With smaller masses, in the more modern type of equipment, the load is at a much more uniform temperature as it passes through the transformation range. Even though the controls are set for the fast cooling rate (20° F per hour), the exothermic nature of the transformation will tend to hold the temperature of the load at the "critical" for as long as several hours. The temperature of the transformation range need not be determined in the laboratory; the location can be observed readily from the level portion of the time-temperature chart for the "load." Thus it is possible to introduce refinements in the cooling cycle which are well outside the scope of the old batch type pot ovens. The ratio of alloy tray weight to casting weight is one to two and one-half.

The manufacturers of this equipment do not undertake to tell the foundry how to anneal their particular iron. The attitude is rather that, to produce a satisfactory malleable, it may be necessary to make certain adjustments, none which appears to be particularly desirable but all of which have been used commercially:

a. Alter white iron composition (silicons on the order of 1.40 per cent).

b. Extend the time during second stage

c. Purchase extra capacity for second stage—two first-stage units for three second-stage units, for example.

For a small installation, it is preferable to have a 48-hour cycle so that shifting the load from the first to the second stage oven (left-hand car, Fig. 6) is done at the same time each day and the greatest use of power (on the initial heat up) is an off-peak load.

In data published by the manufacturer, a typical time-temperature cycle is given as shown in Fig. 2. The first-stage holding temperature of 1750° F is about the top for commercial work since warping of the casting gets to be a problem. A time-temperature relationship is shown for an iron containing 1 per cent silicon and 2.6 per cent carbon:

Temp, ° F	Time in Hours (1st stage)
1650	30
1740	10
1830	3

G OF WHITE IRON

By RICHARD W. PARSONS*

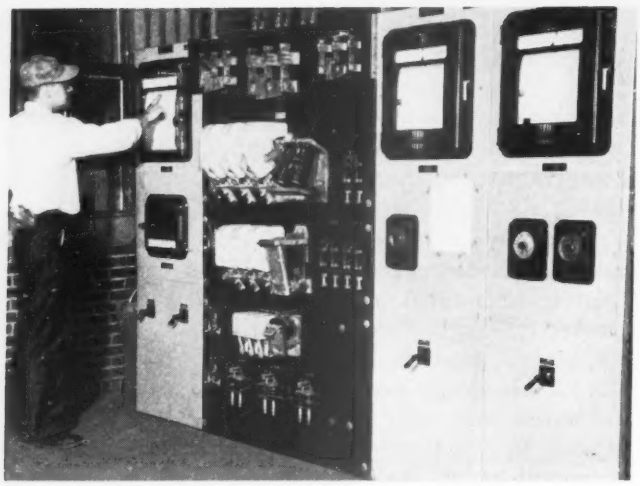


Fig. 4—Control panel for annealing furnaces is located in substation. Temperature controls for first-stage annealing at left, those for second stage are at right. Contactors on center panel

The second stage (Fig. 2) features a uniform cooling throughout the 100° F spread (1400-1300° F) wherein lies the transformation range. The controls are set to have the furnace temperature decrease at the selected rate; the cooling furnace drags the temperature of the load of castings down with it, with a lag of 25° F or so between the two temperatures, depending on the position of the thermocouples and the setting of the controls. There is a fan to promote cooling which cuts "on" and "off" as required. The second-stage cooling may vary from 6 to 25 hours depending on the section, analysis of the iron, and the results required. With conditions as shown in Fig. 2 the uniform cooling rate from 1400 to 1300° F is about 5° F per hour.

After working out of some initial difficulty with under-anneal, due to moisture in the new refractory lining, it was found that a uniform cooling cycle (5° F per hour) from 1400 to 1300° did not produce the desired results in the allotted time. The second-stage anneal frequently was incomplete with a duplex-melted white iron of 2.50-2.60 per cent carbon and 1.00 per cent silicon. At present the most probable value for carbon is 2.50-2.55 per cent with a desired silicon content of 1.10 per cent (note that silicon is slightly higher).

Faster Annealing Through Second Stage—It was decided, rather than to change radically the composition or annealing cycle, to attempt a solution by other means. It was necessary to make some changes (in the gearing) in the controls so that a very slow cooling rate (1½° F per hour, as a starter) could be used through the transformation range — easily located, as noted previously, by the leveling off of the cooling curve for the load. This idea was tested on the 16th anneal and, since it seemed to work, was adopted immediately.

There followed a period of tinkering with the cycle to determine some of the limiting factors. During this time the first stage temperature was reduced from 1760° F to 1700° F. This reduction should improve the life of heating elements and alloy containers, and reduce warpage of castings. It might be possible to reduce the temperature still further but it seems like a good idea to have some factor of safety. Slight changes were investigated, to determine the effect of different temperatures and rates of cooling, until what follows was worked out and established.

For second stage, the controls (Fig. 4) are set for a differential of 25° F between temperatures of "furnace" and "load." When a hot car is shifted to the second stage oven (Figs. 6 and 7), the load heats the furnace—not shown on either Figs. 2 or 3. After the furnace temperature reaches its peak (in about a half hour), the low-temperature control switch and the blower control switch are turned to "automatic." Governed by the 25° F spread between the furnace and the load, the latter temperature is lowered to 1425° F. The cooling rate is 20° F per hour from 1425° F on down to near the transformation range (1370° F); allowance must be made for a tendency to "overshoot." The slow cooling rate (furnace)

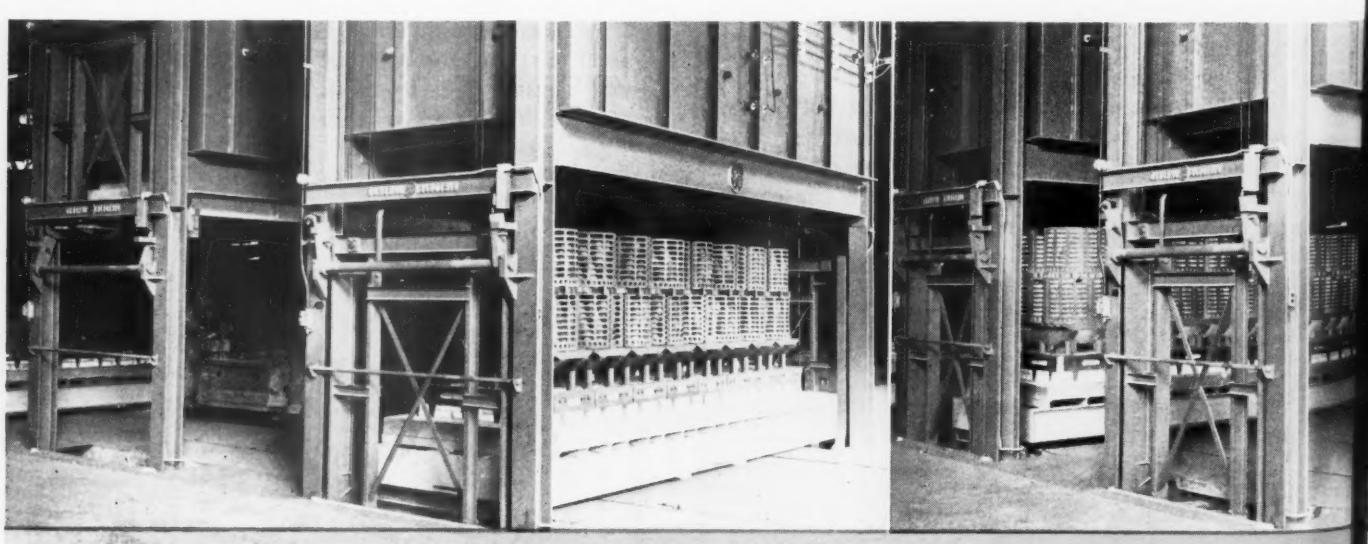


Fig. 5—Car removed from second-stage furnace at 1340°F or less. Castings are fully annealed. Fig. 6 (right)—Car on left removed from first-stage furnace at 1700°F, ready to be pushed over for second-stage annealing. Car on right is cooling from second stage fast enough to prevent galvanizing [illegible] ment. [illegible] Hot car (170 [illegible] eing ele[illegible] temperature [illegible] for its se[illegible]

timer is set at 15 hours.

Fig. 3 shows the slow cooling rate through the transformation range to be but a fraction of that in Fig. 2—1½° F per hour has been used and present practice is ¾° per hour.

If an inflexible schedule is employed, and something gets out of line, like a thermocouple, it may happen that the very slow cooling is taking place *after* the load is through the transformation range. Checking of the charts is necessary to be sure the slow cooling is being properly done.

The operation is nowhere near as arithmetically precise as we might like to see it. Usually during slow cooling, the time that the load is in the ten degree range, 1370-1360° F, will be short (1 or 2 hours). The temperature will dwell the longest (8 to 11 hours) in the range 1360-1350° F, and the balance of the 15 hours is spent cooling from 1350 to 1340° F. The situation is sometimes reversed, the temperature dwelling the longest between 1350 and 1340° F. Sometimes, the time intervals may be nearly equal in the temperature ranges 1360 to 1350° F and 1350 to 1340° F. Due to the temperature gradient in the load, the thermocouple readings will vary at different heights, so the location should be held constant.

As soon as the load is through the transformation range, the second stage is complete and the car may be removed (Fig. 5). It has not been found necessary to cool any lower than 1340° F before lowering the car, though it may be done to match the shifting time.

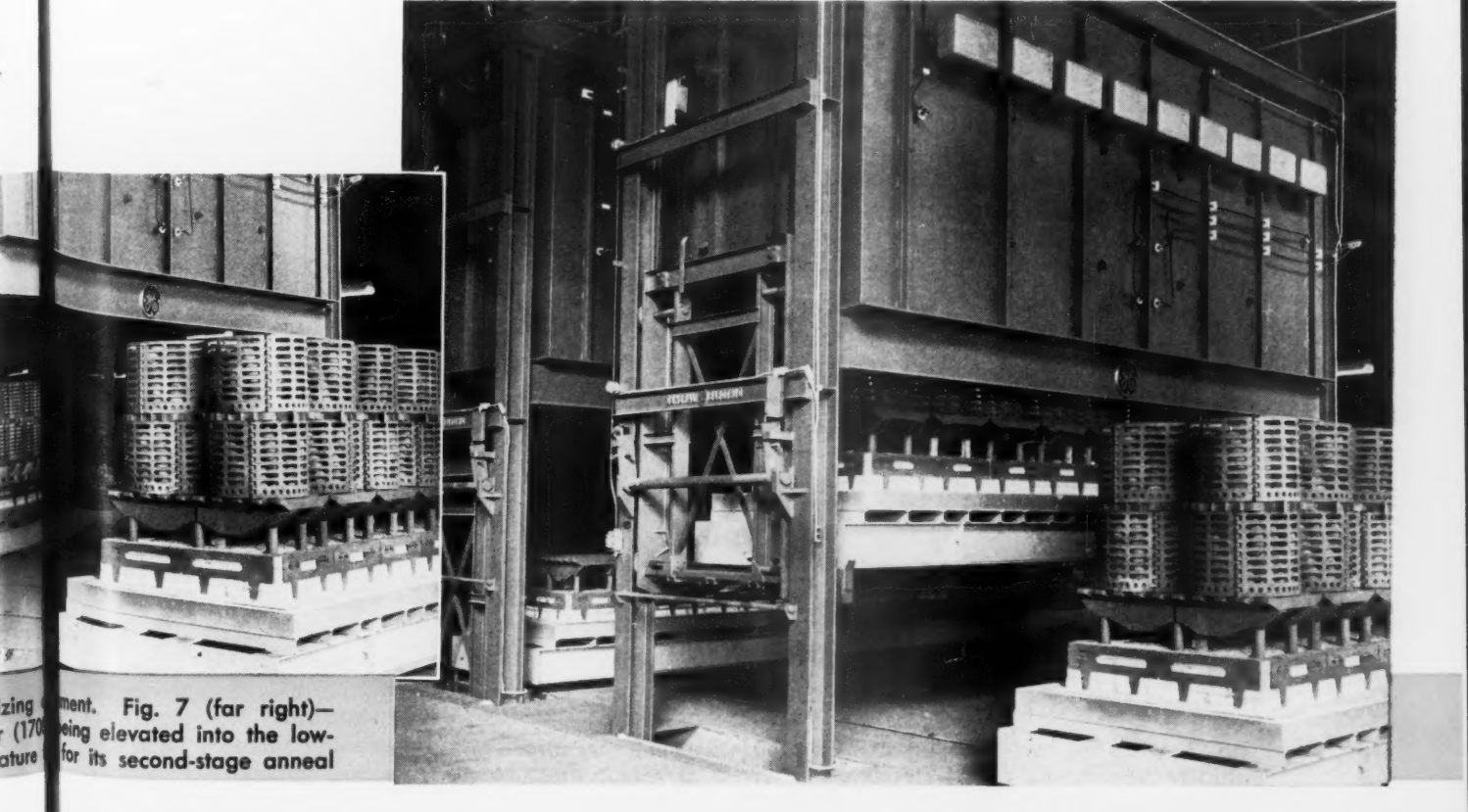
The castings cool rapidly enough, in still air, to effectively solution treat them and avoid the possibility of galvanizing embrittlement (right hand car Figs. 6 and 7). We believe that the above is not true for larger masses as from a 15 ton oven.

Superior Mechanical Properties Obtained—Initially, the mechanical properties, as shown by tensile bars (the ASTM alternate shoulder specimen being used), were better from the old type ovens (a certain degree of decarburization was probably helpful), but now the electric anneal produces the better values. Since the old style ovens produce "as annealed iron," the yield strength would be expected to be less, and the elongation slightly greater, than would be the case with electric annealed iron—which is, in effect, annealed *and* solution treated. Yields are higher for the electric annealed bars, but the elongations which should be lower also are usually *superior* as compared to bars from the same mold annealed in old ovens.

A second unit, one "high" and one "low" chamber, is now in operation, making a potential electric-annealing capacity of 16 tons of castings per day.

Summary—By applying known facts to the problem of second-stage anneal, it has been possible to malleablize a conventional analysis of white iron in a 48 hour cycle. Taking advantage of the close control possible with small car-type electric ovens, and by cooling as slowly as ¾° F per hour, the castings are made to dwell at temperature for longer times through the transformation range—stable to metastable — where annealing is fastest. The mechanical properties, as shown by tensile bars, are superior to those obtained from the old pot-type anneal ovens. As measured visually, the amount of decarburization is much less (practically nonexistent) from the electric ovens.

*At the time of his death on Oct. 5, the author was technical director of the Ohio Brass Co., Mansfield, O.



ment. Fig. 7 (far right)—
eing elevated into the low-
for its second-stage anneal

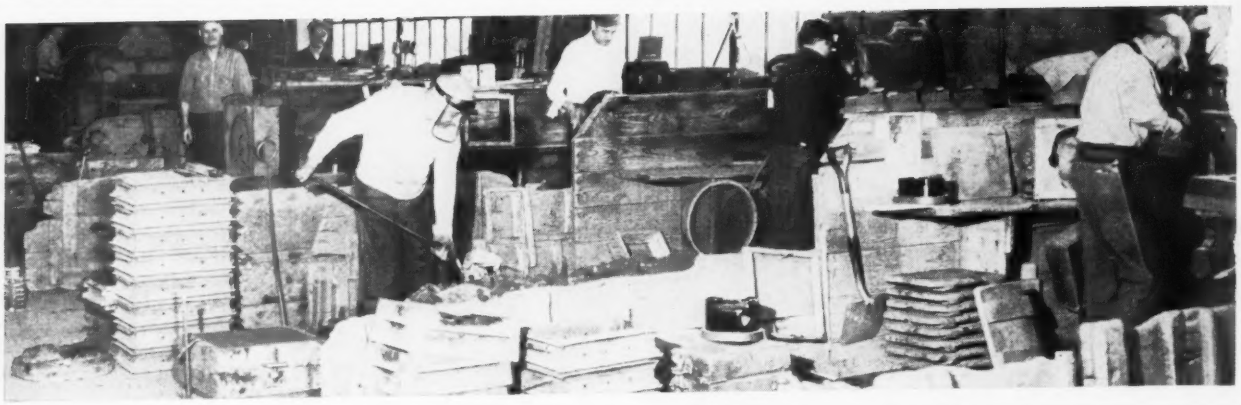


Fig. 1—Sand molding department along one side of the shop is devoted to short production runs of castings which are made on molding machines and on the bench

aluminum foundry

Has Three Strings for its Bow

BY EDWIN BREMER
Metallurgical Editor

Fig. 2—While the coreroom may appear small, it is compactly arranged for the efficient manufacture of a wide variety of cores, as may be seen in the view

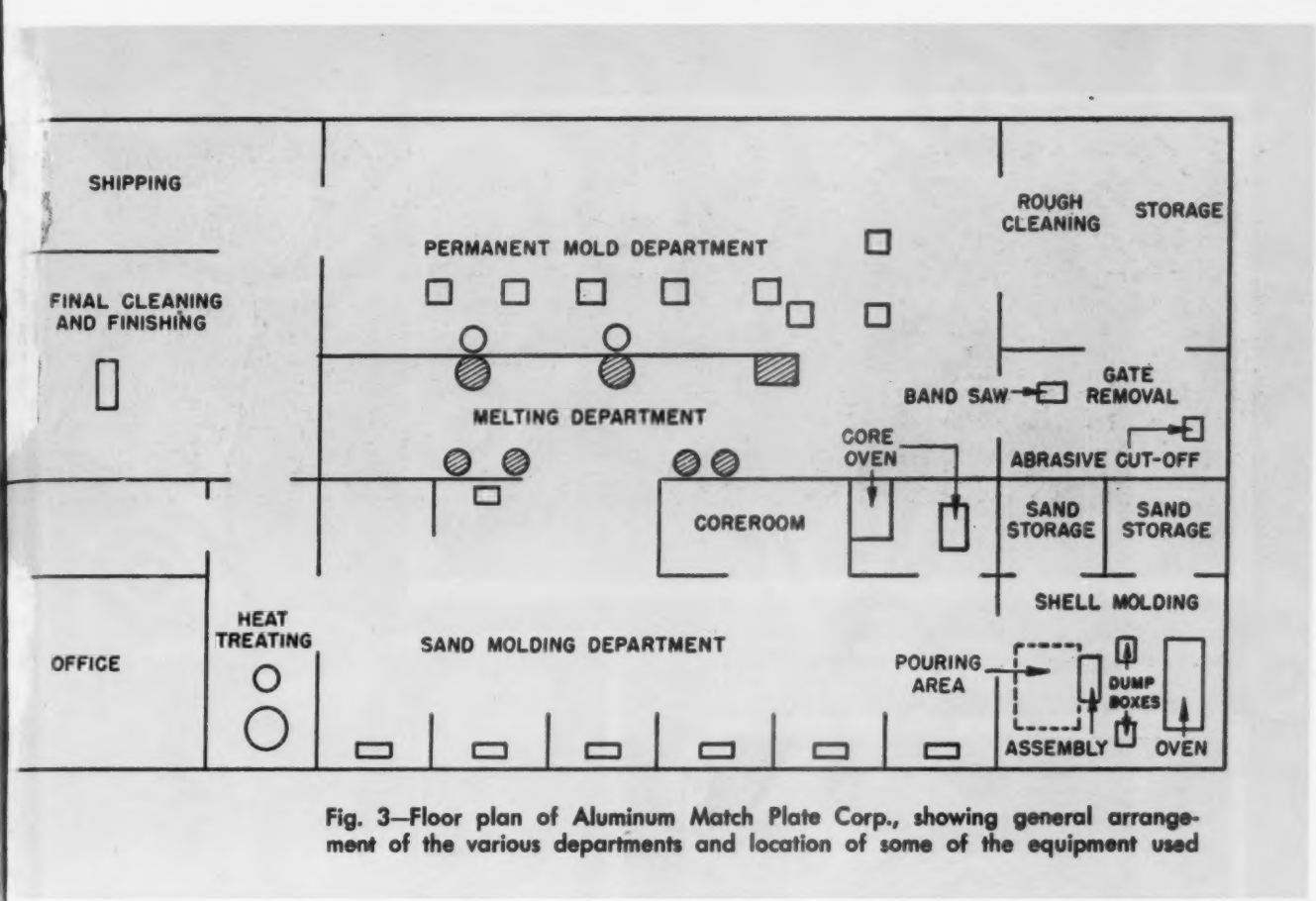


Fig. 3—Floor plan of Aluminum Match Plate Corp., showing general arrangement of the various departments and location of some of the equipment used

ALTHOUGH organized originally in 1934 for the production of aluminum matchplates, patterns and similar appurtenances, the Aluminum Match Plate Corp., Buffalo, for many years has done only a token business in that field. In fact, except for a rush job, patterns for its own use are made by other firms.

Early in its career the company began to make some aluminum sand castings, principally as an accommodation to some of its matchplate customers. Exacting experience in manufacturing cast aluminum matchplates and patterns served the firm in good stead in producing aluminum sand castings, and that phase of its operations expanded until the positions of the two were completely reversed, with the matchplate and pattern phases becoming the accommodation.

Later on the company became interested in permanent mold casting, particularly the production of certain types which involved long runs. Experimental work proved that such conversion from sand casting benefited both foundry and customer, and present practice is to convert sand casting methods to permanent mold process when the volume warrants the change. Of course, in some instances with certain types of castings, the permanent mold process shows excellent advantages even though the volume of production is relatively low.

To implement further its manufacturing procedures for producing quality aluminum alloy castings the company engaged in considerable experimental work on the shell molding process, and has established a department for making castings by that method. As in the case of the permanent mold department, work may be converted from the sand molding department or is designed originally to be produced by the shell molding process.

While the Aluminum Match Plate Corp., does not maintain an x-ray examination department, it regularly employs the services of a commercial firm engaged in that field to provide radiographs of some of its castings. More particularly that service is used in the pilot stage of operations before the casting is placed in production. Through such procedure the company is assured that its gating and other practices are proper to produce sound castings. Similarly, when chemical and physical testing are required, the firm obtains the services of a commercial laboratory.

As indicated in the accompanying sketch, Fig. 3 the foundry is located in a one-story brick structure about 60 x 110 ft. Office, final cleaning and finishing, and shipping departments are in the front of the building. Sand molding and shell molding departments are along the north side while the permanent molding department and rough cleaning departments are arranged along the south side. The melting department is approximately in the center and adjacent to the sand and permanent molding departments. Coreroom is near the end and alongside of the sand molding department.

The molding department is divided into eight molding floors, with six along one wall as shown in Fig. 3, and the other two across the gangway or aisle at the upper end. Floors are about 10 x 10 ft. Some of the floors are arranged for bench or hand molding

Fig. 4—Close-up of pouring a large permanent mold casting. Metal holding furnace is at the right

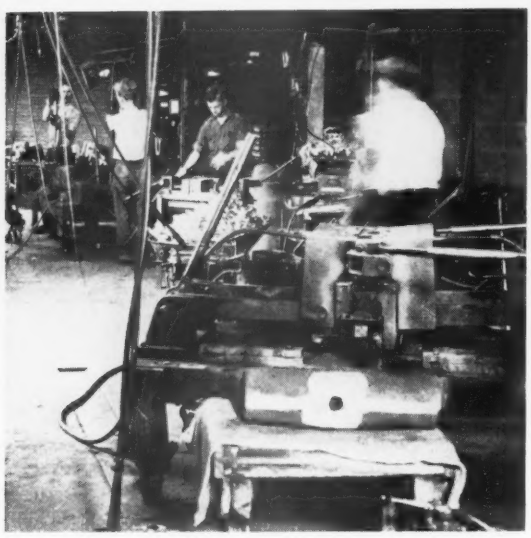


Fig. 5—Another view of the mold shown in Fig. 4 showing in foreground the large sand core used

Fig. 6—Although not included in the illustration, shell molds are poured in a hooded, curtained area

and others are equipped with molding machines. Method of molding depends upon such factors as quantity, size, and pattern equipment supplied. In general, short-run work, loose pattern equipment, and larger size castings are made by hand while the longer-run work on matchplate patterns is produced on machines.

Practice on both types of floors is to set out a half dozen or so molds on the floor close to the gangway. These are poured off. When the castings have solidified, the molds are shaken out and the flasks and bottom boards placed handy to the molder. Castings are removed from the sand, put into wheelbarrows and transported to the rough cleaning department. Molding sand is retempered by addition of a small amount of water, cut over with a shovel, and then shoveled onto the heap at the molder's bench or machine.

Following that, the section of the floor on which the pouring was performed is swept roughly to remove most of the loose sand and keep the floor reasonably clean. However, at night a small maintenance crew carefully cleans up the whole foundry and puts everything in its place so that when the employees come in in the morning they can start work immediately in a pleasant environment. This practice, combined with follow-up cleaning during the day, undoubtedly exerts a worthwhile influence on employee morale.

The coreroom, although small by some standards, is able to turn out a wide variety of cores, as may be observed in Fig. 2. Cores are made by hand and on machines, and are supplied to both the permanent mold department, where they are used for production of "semi-permanent" mold castings, and to the sand molding department. Cores are baked in either of two rack-type, oil-fired ovens located outside the coreroom proper, as indicated in Fig. 3.

Melting department is located centrally with relation to the sand and permanent molding departments, and is walled off from them. Melting equipment for the permanent molding department consists of two

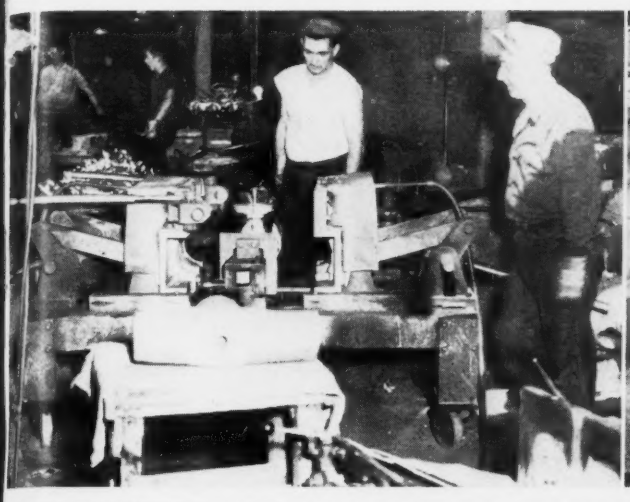


Fig. 7—Large permanent mold in the open position with casting in place to give some idea of size

Fig. 8—Shell molding department showing electric oven, left; one dump box and mold release, right

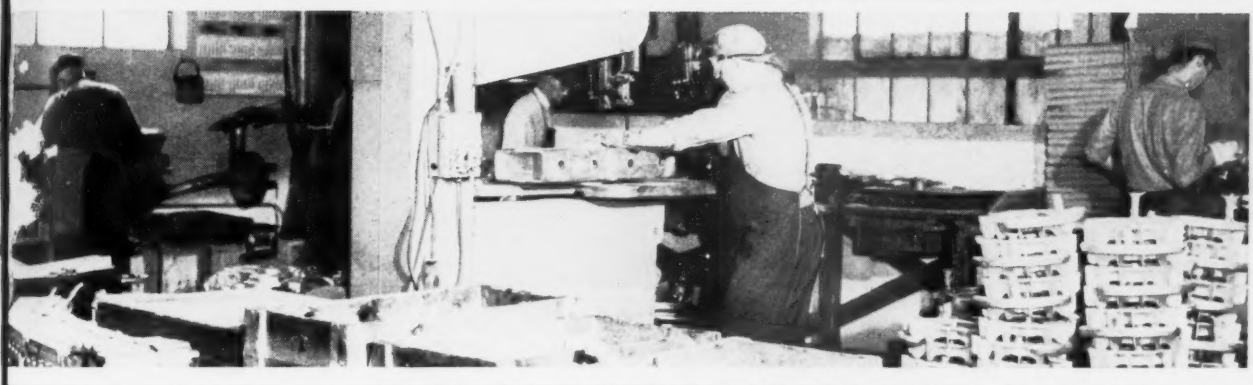


Fig. 9—Final cleaning and finishing of the aluminum castings, as well as the final inspection prior to packing for shipment, is accomplished here

oil-fired, 500-lb capacity, tilting pot furnaces, and three low-frequency electric induction furnaces one of which melts 500 lb of aluminum alloy per hr and the other two melt 200 lb per hr.

The two oil-fired melting units are mounted on platforms about 2½ ft above the floor level so that their contents can be emptied into troughs which in turn lead to two dip-pot, oil-fired holding furnaces on the other side of the wall in the permanent molding department, as may be observed in Fig. 4. The electric induction furnace is the dip-out type located at the floor level with a low platform in front to aid in the dipping-out operation. All melting and holding is accomplished under controlled temperatures. Only composition aluminum alloy ingot and carefully segregated return gates, risers and defective castings are employed as the raw materials.

Metal for the sand molding and shell molding departments is melted in four stationary furnaces located along the north wall of the melting room. They are pot-type dip-out units of 500-lb capacity, and arranged in pairs on either side of the door opening into the sand molding department. Space at both ends of the melting department is used for storage of aluminum alloy ingot.

Figs. 4, 5 and 6 are views of the permanent molding department showing the variety and different sizes of machines in use. All of the machines are mounted on structural steel frames equipped with casters. That arrangement makes it easy to move the machines into storage when not in operation, shift them into other positions along the molding line, or bring them out of storage into the molding line. Mechanisms for opening and closing the mold sections include lever and toggle, rack and pinion, and pneumatic. Choice will depend upon the weight and size of the section to be moved as well as its location in relation to the other parts. In some cases a combination of mechanisms may be used.

Castings produced may be full permanent mold where the cores as well as the mold are made of metal, or the semi-permanent type where sand cores with metal molds are employed. Castings range from a few ounces in weight up to 25 (*Please turn to page* 290)

Fig. 1—Pouring a production sandslinger mold from insulated ladle

Automatic Control of Sand Moisture

By ERLE F. ROSS
Chicago Editor

SEVERAL years ago Neenah Foundry Co., Neenah, Wis., completely modernized its equipment and operations. The 81-year-old gray iron foundry pours about 135 tons of iron per day and divides its production between a jobbing business and its own line of castings.

The improvement program which the company undertook embraced every phase of operation, including handling of raw materials, cupola charging, sand preparation and distribution, molding, coremaking, pouring, shakeout, casting cleaning and inspection, and quality control. Mechanization was taken advantage of to its fullest extent. The result is a highly efficient, high-production operation.

Two separate molding departments are maintained. In one, medium or heavy castings are made by cope and drag molding and small and light-weight castings are turned out with jolt-squeeze equipment. In the other department, heavy castings are produced by sandslinger molding. Each department puts about 400 tons of rammed sand into molds each day.

These requirements for sand are met by two complete, fully-automatic molding sand preparation and distribution systems. One of these serves the production sandslinger operation and also handle sand needs for short run and loose patterns. The other system controls the sand required for small and medium castings produced on the squeezer machine lines, jolt pinpushoff, and cope and drag stations. Both units are designed for flexible operations, consistent quality control and maximum production efficiency.

Since these two sand systems were originally installed, they have been improved with moisture control equipment to make them fully automatic. This

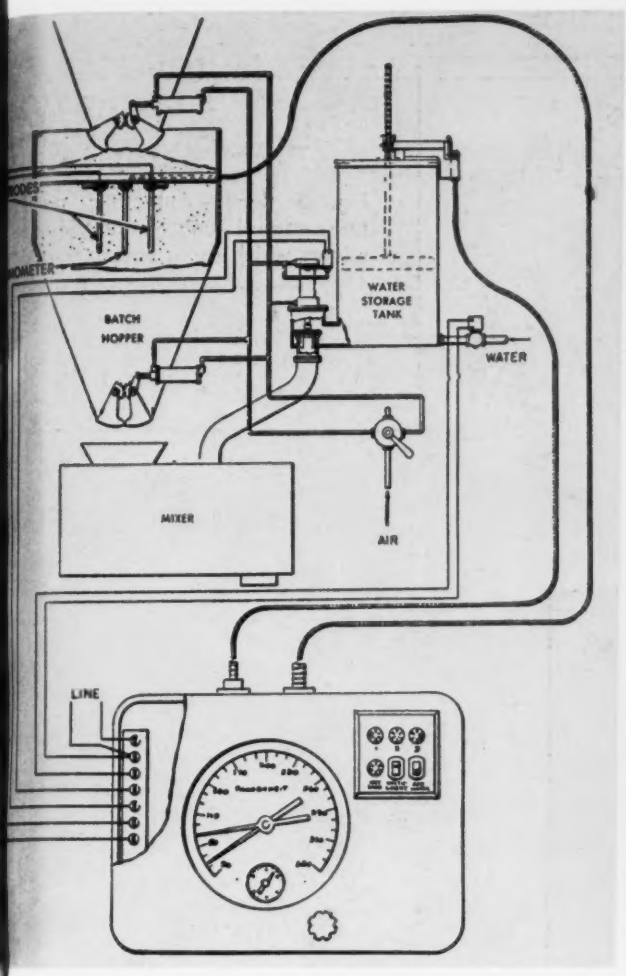


Fig. 2—Schematic diagram showing principal component parts of a sand moisture control installation

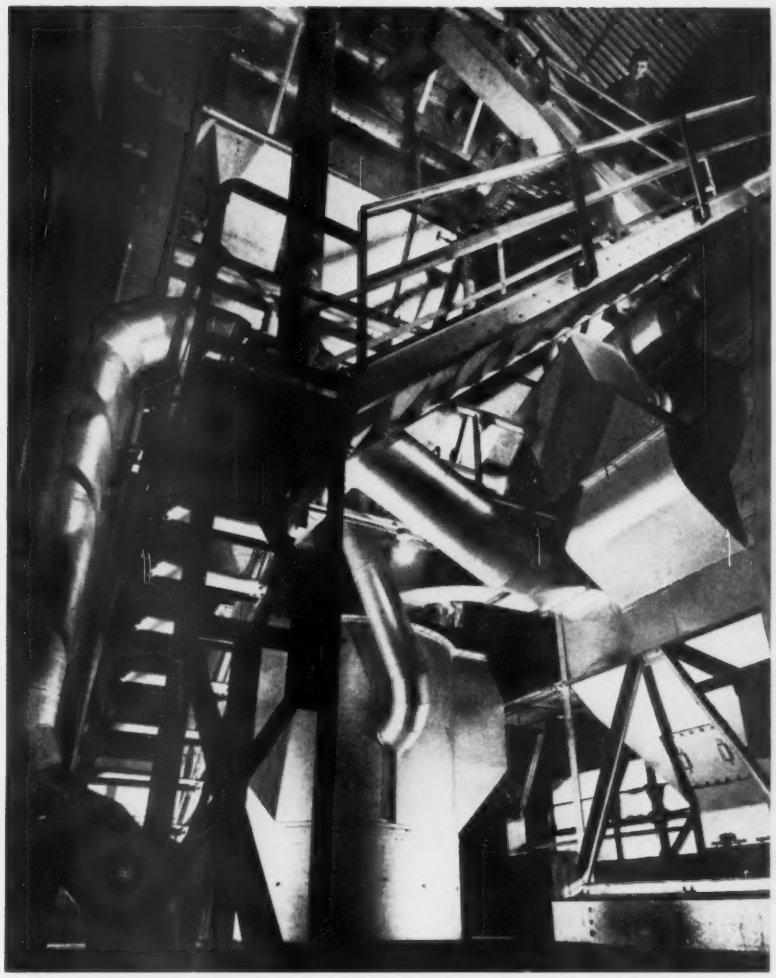


Fig. 3—Sand storage and preparation, with exhaust and cooling units, on one sand conditioning system

equipment, known as the Hartley Hygro-Guide, is a development of Haylco Controls Corp., Neenah, Wis., an affiliate of Neenah Foundry Co. The Hygro-Guide had its initial installation in the Neenah Foundry plant and the claim is that it was the first automatic sand moisture control used in the industry.

With the control instruments, each fully automatic reconditioning cycle produces sand which is controlled in uniform strength and permeability, moisture content and temperature consistency. In addition to moisture control, the instruments direct all sand mixing operations, cycle timing, addition of bonding ingredients and distribution.

Shakeout sand in each of the two foundry departments moves on under-floor conveyors, is carried over a magnetic pulley, screened and reprocessed in mixers. Capacity is sufficient to insure proper cooling and mulling before redistributing to the molding stations. Main storage bin for the squeezer and cope and drag department holds 150 tons; that for the slinger line has capacity for 175 tons. Two No. 3 Simpson mixers serve the former and a No. 3 F Simpson accommodates the slinger operation. From the mixers, the sand is elevated, passed through an aerator and then goes to the distributing belts.

New sand is received at the foundry by boxcar. A car scoop truck transfers the sand to an elevator which conveys it to storage silos (Fig. 7). Replacement sand as needed is drawn from bottom of the silo and introduced into the system.

The automatic moisture control system is comprised of three basic units of equipment, namely, instru-

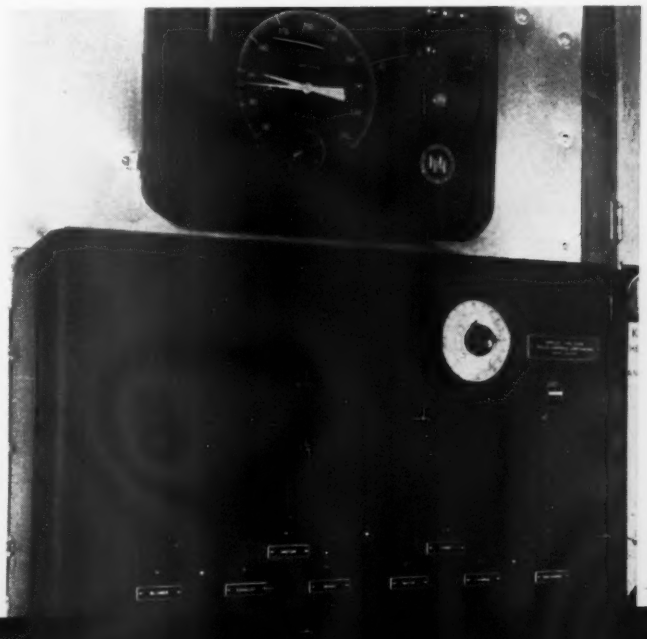


Fig. 4—Close-up of instruments which automatically direct all sand mixing operations. This equipment is on the mixer serving the sandslinger department

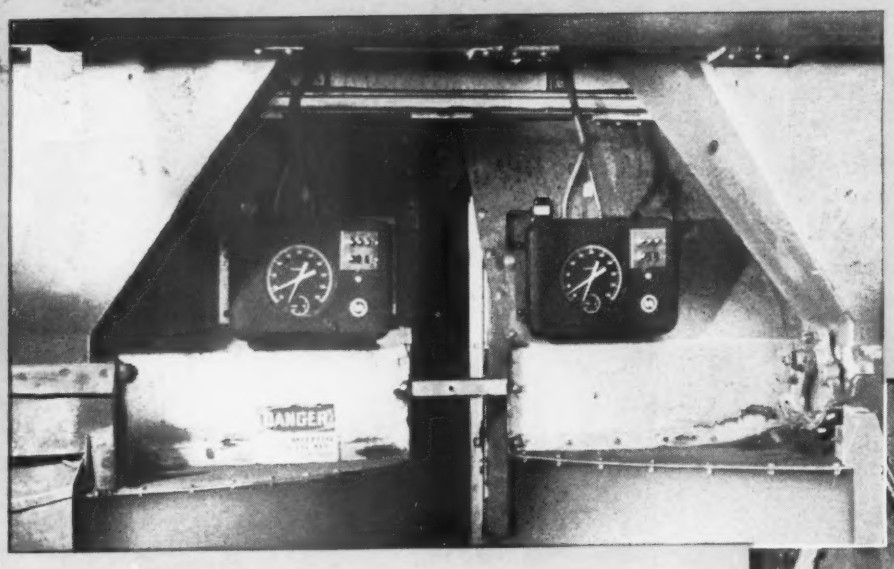


Fig. 5 (left) — Automatic moisture control units mounted on mixers which serve squeezer and cope and drag molding stations

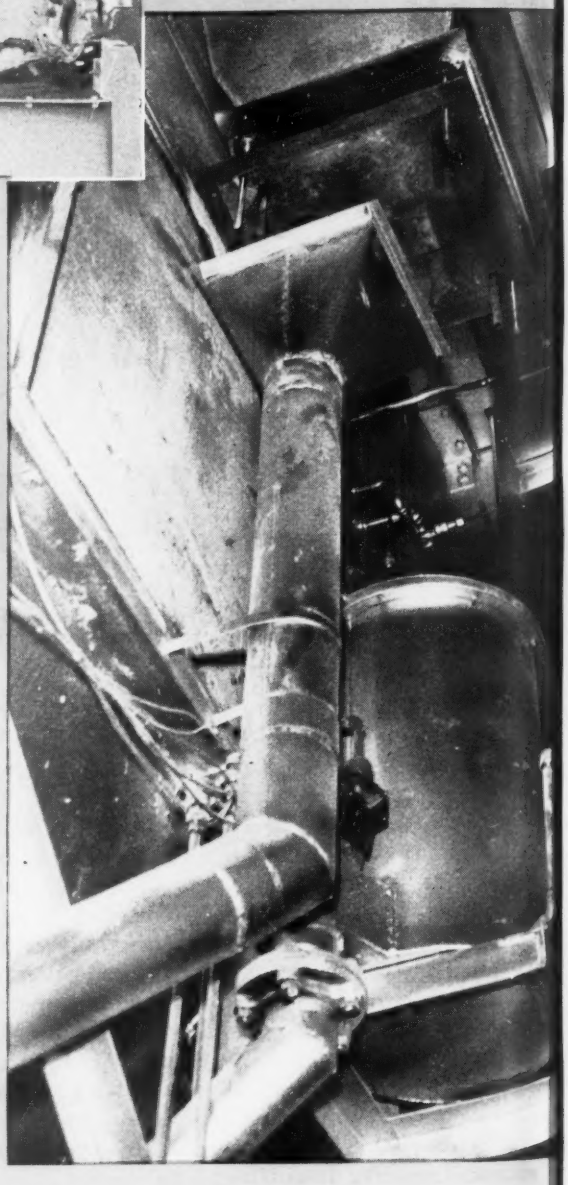


Fig. 6 (right)—Showing the 30-gallon water tank (lower right). One of the bond addition units in upper center

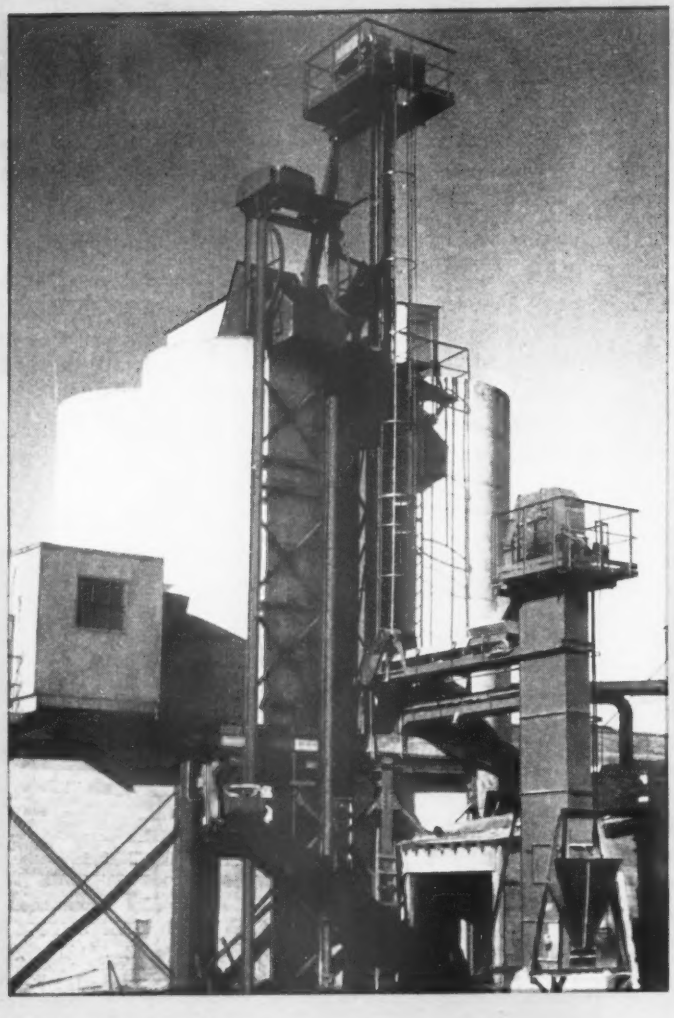


Fig. 7 (left)—Silos used for sand storage. New sand is received by boxcar, transferred by car scoop truck to elevator and conveyed into silos. Replacement sand for the system is drawn from the silos at bottom as needed

ments for measuring the temperature and moisture of the return sand, a water unit for storage and discharge of mixer water, and the unit that co-ordinates operation of the system.

A schematic diagram of a Hygro-Guide installation is shown in Fig. 2. Explained briefly, the device is set manually to the per cent of moisture desired in the molding sand. After this setting is made, the operation is entirely automatic. When the measuring hopper is filled with return sand the control will automatically determine the amount of moisture in the return sand, determine the temperature of the sand, and then co-ordinate these factors and determine the required amount of water which is charged into the storage tank. The timer then fills the mixer with the measured amount of sand and at the same time the water in the storage tank is discharged into the mixer. The mixing action then starts.

Sand Storage Bin Is Insulated

A better understanding of the control can be gained from its operation in the sand system which supplies Neenah Foundry Co.'s slinger molding line. As stated previously, the overhead sand storage bin is of 175 tons capacity. Incidentally, to prevent condensation of moisture inside the bin, the outside is insulated with 2-in.-thick rock wool bats clipped on.

Fig. 4 shows the control instruments attached to the slinger line sand mixer. This mixer is charged from a batch hopper which holds approximately 4000 lb. of sand. The Time-Guide controls opening and closing of the mixer discharge door, charging of the mixer, making of the water additions, making of bond additions, opening and closing of cooling hood dampers and length of mixing time. The mixing time can be regulated for any time up to five minutes.

The timer is controlled by the amount of sand in the plate feeder bins over two slinger molding stations. Slinger No. 1 is located 50 ft from the mixer and is fed from a plate feeder from a 9-ft-diam bin. Slinger No. 2 is 190 ft from No. 1 and is fed from a plate feeder from a 7-ft diameter bin. The mill belt is 60 ft long and feeds the No. 1 slinger. Directly above No. 1 sand bin is a V-type plow which normally is in the down position. No. 1 slinger uses the greatest amount of sand, and when the bin is two-thirds empty an electronic probe starts the time guide to cause delivery of sand.

When the bin still has room for a whole mixer of sand, the probe calls for the mixer to complete its mixing and to discharge its batch, but it will not allow another batch to be charged into the mixer until either of the two slinger bins calls for more sand. The timer can not stop during a mixing cycle.

Sand is supplied to No. 2 slinger bin by an independent belt 180 ft long, and when this bin is satisfied this belt does not run. The bin is equipped with an electronic probe like the one in No. 1 bin, but instead of being connected directly to the timer it is connected to a valve which in turn operates an air cylinder to raise the plow above No. 1 bin. A switch mounted on the plow closes when the plow is raised and this starts the timer and the 180-ft belt. When bin No. 2 is satisfied, the plow drops and whatever sand remains in the mixer and on the mill belt is plowed off into No. 1 bin. A switch causes the 180-ft belt to run until it is cleared of all sand.

Should both slingers be calling for sand at the same moment the plow at No. 1 bin raises and drops intermittently to allow about half of the sand to move along to No. 2 bin.

The automatic sand moisture controller consists of a stainless steel, mercury thermometer bulb and a pair of stainless steel electrodes. The bulb takes the temperature of the sand in the batch hopper and transmits this temperature to the controller. The mercury bulb will average out hot and cold strata of sand. The electrodes detect moisture, if any, and transmit this information to the controller.

The controller then correlates the temperature and moisture factors, opens a water valve and allows the correct amount of water to flow into a 30-gallon tank. This is accomplished without use of a water meter. The tank is shown in Fig. 6. These operations are taking place while the mixer is mulling a batch prepared previously. After the timer has closed the discharge door of the mixer, it opens the discharge valve on the water tank, allowing the contents of the tank to run into the mixer. The water flow is by gravity through a 4-in. pipe. About two seconds later the timer opens the batch hopper gates to allow the sand in the hopper to be charged into the mixer. Then the batch hopper discharge gates close, gates at the top open and the hopper is recharged from the main storage bin for the cycle to be repeated.

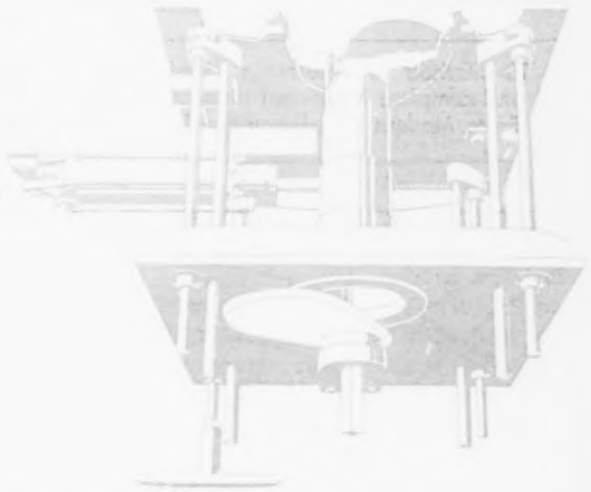


Fig. 8—Sketch showing one of the devices which automatically feed bond material to batch hopper

Moisture content of prepared sand can be varied in graduations of 0.2 per cent, an adjustment which is made by changing the base water setting indicator. Once set, the instruments automatically maintain the moisture content of the prepared sand within plus or minus ¼ of 1 per cent. Neenah Foundry carries 4.2 per cent moisture in the sand for slinger molding and 3.8 per cent in the sand used in the squeezer and roll-over department.

Bentonite, seacoal and wood flour are the sand bonds used at Neenah, and (*Please turn to page* 184)

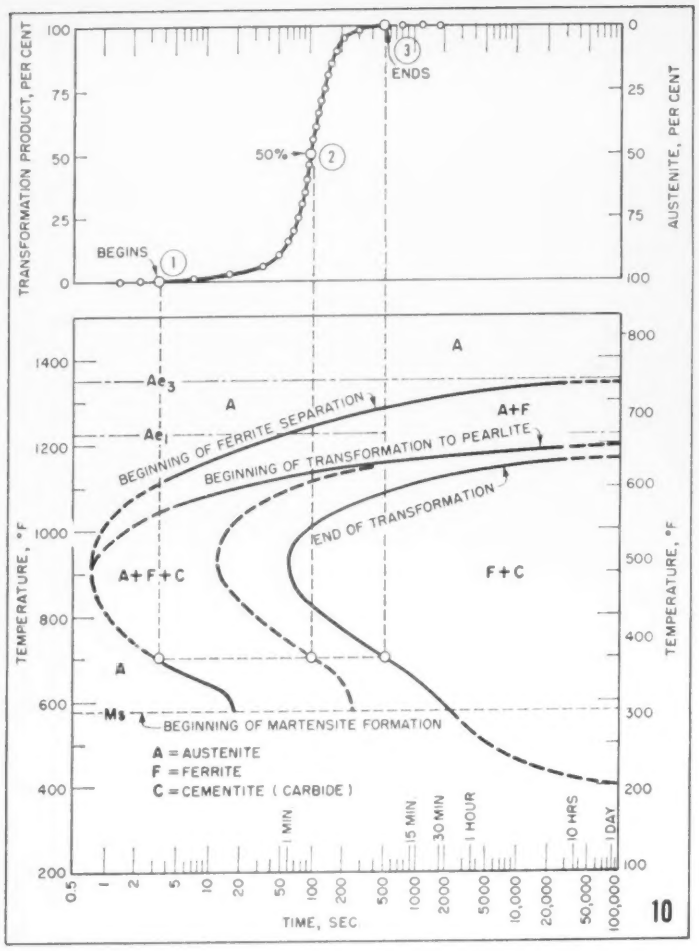
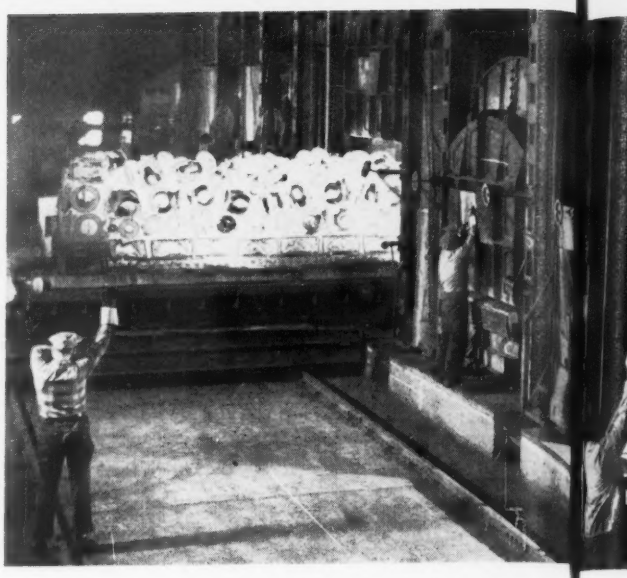


Fig. 10—Method of determining isothermal transformations (top) and complete isothermal diagram for 0.45% C, low-Ni steel. From *Modern Metallurgy for Engineers* by F. T. Sisco



HEAT TREATMENT

By JOHN HOWE HALL

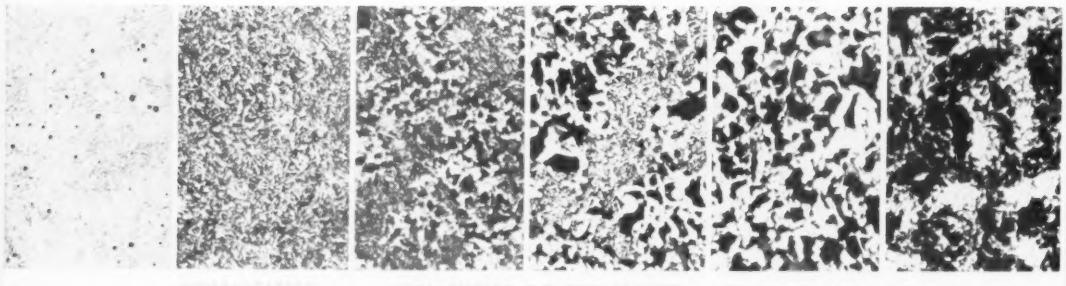


Fig. 11—Schematic diagram, showing effect of cooling rate on structure, illustrated by micrographs of low-alloy steel (0.30 C, 1.0 Mn, 0.50 Cr, 0.70 Ni). 100X with nital etch. Steel Founders' Society Report 15

Effects of ferrite and pearlite on cast steels containing 0.18 to 0.20 C, and time-temperature relationships as they effect structure and properties of all steel castings during heating and cooling in the heat treating process, are discussed in this second of three articles

NF STEEL CASTINGS

STEELS containing less than 0.18 or 0.20 per cent C consist so largely of ferrite that their properties are affected but little by the small amount of pearlite they contain. Therefore, they have the comparatively low tensile strength and yield point of ferrite, and great ability to stretch under slowly applied load. Their small patches of pearlite are often more or less equiaxed and distributed at random through the ferrite. They behave, therefore, much like globules of type I sulphide inclusions; that is, they do not interfere with the ability of the ferrite to stretch without rupture.

Presence of pearlite in the steel leads to an increase in its strength and a decrease of its ability to stretch without breaking, approximately in direct proportion to the carbon content. This is because pearlite grains consist of a mixture of soft ferrite, and hard strong cementite, and naturally are much stronger than ferrite. If a steel consists entirely of laminated pearlite in comparatively small crystals, its tensile strength will be about 120,000 to 130,000 psi, in marked contrast to the 50,000 psi or less of pure ferrite. When enough pearlite is present in a steel, therefore, it so reinforces the surrounding ferrite that it will endure higher stress, but stretch proportionally less, before it ruptures. The greater the amount of pearlite present, the higher the strength of the steel.

The coarse network or Widmanstaetten structures in untreated cast steel decrease its strength and its ability to stretch under slowly applied load, or to endure sudden shocks, because they furnish planes of weakness along which rupture may occur. If the coarse crystallization of the steel in the cast condition is broken up and replaced by an aggregate of finely divided crystals, rupture cannot follow such easy paths, but must cut across numerous crystals. The cleavage lines of the small crystals are arranged randomly, so that in most of them fracture must be across, rather than parallel to cleavage lines. For this reason fine-grain metals are in general much stronger and more ductile than coarsely crystalline ones. Heat treatments are designed to produce this change in internal structure, and at the same time to relieve the stresses set up in the castings as they solidify and cool.

The change in the structure is brought about by heating the castings to a temperature somewhat above that represented by the line *GOS* in Fig. 4 (October issue). As steel passes through the transformation range, the pearlite and ferrite coalesce and the existing coarse crystallization is broken up and replaced by a new aggregate of austenite grains of much smaller size. At the same time, the carbon begins to diffuse evenly through the austenite crystals, instead of being concentrated in the areas occupied at low temperatures by the pearlite. The process of carbon diffusion is quite rapid, but none the less requires a certain amount of time to become reasonably complete.

Just as the austenite crystals in freshly solidified steel grow during cooling through the range of temperature between *AE* and *GOSE*, so do the new fine crystals formed on heating through the transformation zone, grow when the steel is held at temperatures above *GOSE*. The higher the temperature to which the steel is heated, the coarser the grain size becomes. A short heating has a less pronounced effect than a longer one, but after perhaps two hours exposure to any given temperature, there is no further increase in the grain size. The deoxidation practice followed in making the steel, however, has a considerable effect upon the tendency to grain growth. In silicon-killed steels, rapid growth begins at a lower temperature than is required to coarsen the grain of those de-

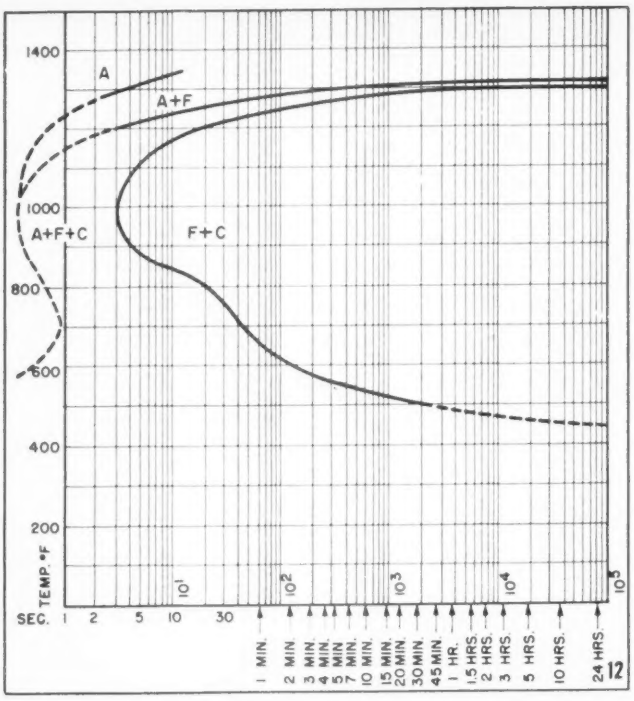


Fig. 12—S-curve diagram of 0.30% C cast steel. Steel Founders' Society Report 1

oxidized with aluminum. The latter retain a fine grain size at temperatures that coarsen silicon-killed steels, but at higher temperatures their grain size also increases.

About 1908, the late Dr. Henry M. Howe suggested that the inhomogeneity of cast steels might be corrected by long exposures to quite high temperatures, followed by further heatings at lower temperatures. Under his direction, the author made a number of experiments to see if cast steel would have more uniform microstructure and better mechanical properties after such a series of heat treatments. Heating to 1832° F for a maximum of seven hours greatly increased the grain size, which was decreased again by a second heating at lower temperature. We were unable, however, to find any improvement in mechanical properties or in uniformity of structure, due to the elimination of inhomogeneity by diffusion, and therefore decided that heating above a maximum

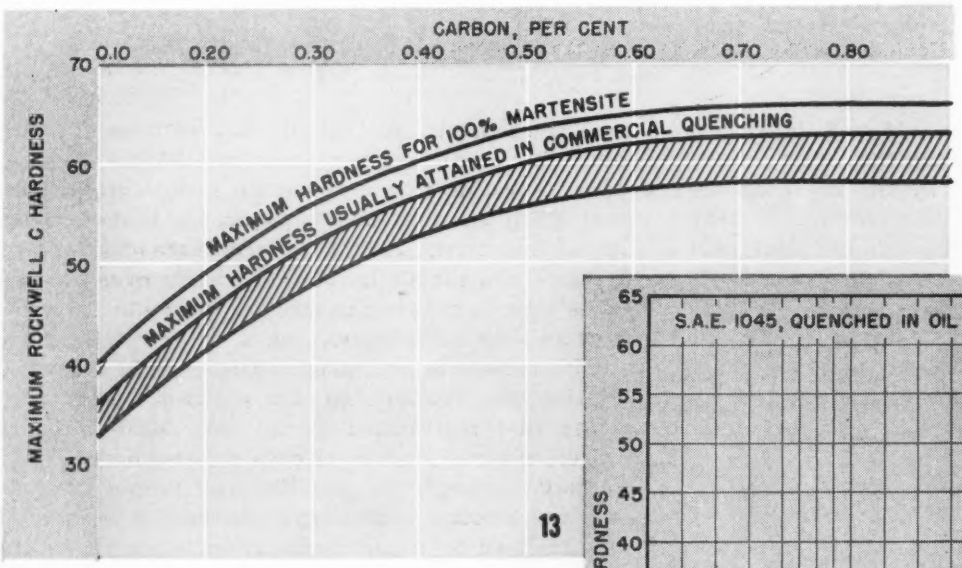
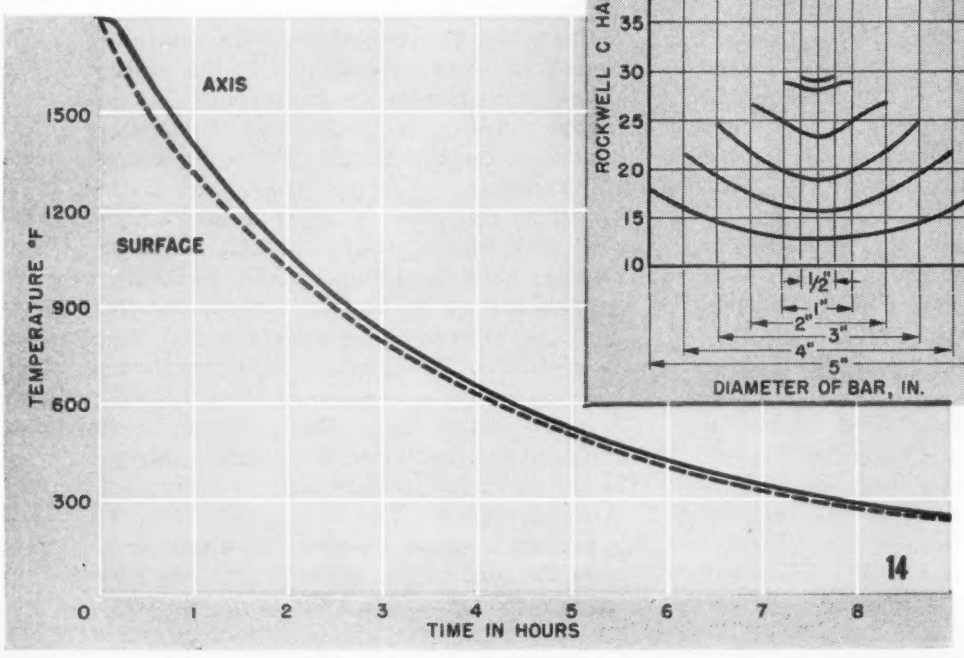


Fig. 13—Relation of carbon content to maximum martensitic hardness (upper curve) and maximum hardness usually attained, see hatched band. From *Modern Metallurgy for Engineers* by Frank T. Sisco



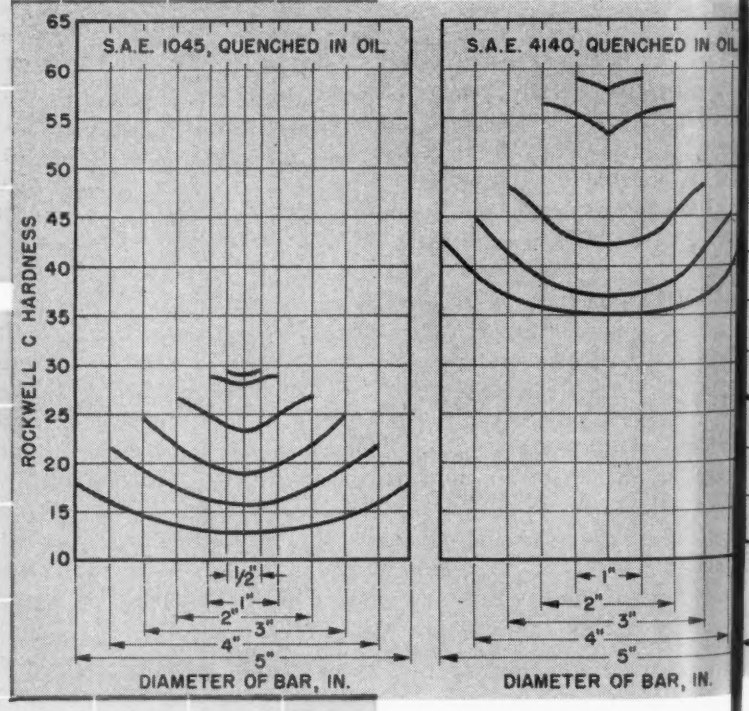


Fig. 14 — Cooling curve, 12-in diam steel cylinder, initially 1800°F, cooled in still air at 65°F. From "Heat Treatment of Medium Carbon Cast Steel" by K. I. Clark, H. F. Bishop and H. F. Taylor, *Transactions*, AFS, 194

of 1650° F had no beneficial effect in carbon steels.

At a later date, several investigators, notably the late W. J. Merten and Fletcher Harper, presented the results of experiments from which they concluded that by long heating at temperatures up to 2000° F, even very heavy sections of cast steel could be completely homogenized by diffusion. Upon further heatings at temperatures just above *GOS*, ferrite and pearlite in their samples were evenly distributed, regardless of the rate of cooling from the final heating temperature. As a result of their work, it was believed for a number of years that the uneven distribution of the elements due to dendritic segregation could be largely eliminated by high-temperature "homogenization," and the practice was widely adopted for alloy steel castings that had to endure suddenly applied heavy stresses.

More recent investigators, however, have found that though this treatment decreases, it by no means eliminates, dendritic inhomogeneity. Apparently, therefore, it is often not of sufficient value to offset its disadvantages, such as the heavy scale loss it causes, and the chances that the castings will sag under their own weight and be seriously distorted. Some alloy steels, however, contain complex carbides which can only be broken up and caused to diffuse at quite high temperatures. Homogenizing of these steels is often necessary, in order to bring out their best mechanical properties.

The rate at which cast steels cool, after being heated above the temperature represented by the line *GOS*, has a pronounced effect upon the distribution of the grains of ferrite and pearlite, and upon the mechanical properties of the steel. This was first described by the present author in a paper presented before the American Society for Testing Materials[4] and in his first book[5], published in 1914. More recent investigators have shown the underlying reasons for the facts reported, but not explained, in the author's early technical papers.

The classical work of Davenport and Bain, resulting in the development of the well-known time-temperature-transformation curves, familiarly known as "S-curves", has enabled the metallurgist to predict with considerable accuracy the types of structure that will be produced by any given rate of cooling from above *GOS*. These curves are derived by heating small specimens of a given steel above the transformation range for several hours, then transferring them quickly to molten baths of lead, salt or other material. They then are held at given temperatures for varying lengths of time and finally quenched in iced brine to fix the structures produced by the several treatments.

When any but very low carbon steel is cooled very rapidly from above the critical temperature range, the separation of ferrite and the transformation of the remanent austenite to pearlite does not occur. Instead, the entire mass of austenite transforms at low temperature to another form known as "martensite." It is generally agreed today that martensite consists of alpha iron containing a multitude of sub-microscopic particles of carbon or cementite. Its hardness, composition and appearance under the microscope in an etched section depend upon the amount of carbon in the steel. With 0.80 per cent C present, martensite is glass-hard and brittle, and its microstructure consists of an abundance of acicular (needle-shaped) crystals. In lower carbon steel, the hardness is not so great, the metal may show considerable toughness, and the needles are less plainly evident.

In obtaining the data for an S-curve, the specimens that are held in molten lead at temperatures in the transformation range liberate ferrite, in amounts that vary with the time of holding at temperature. Similarly, if the specimen is held at temperatures just below the transformation range, ferrite separates and pearlite forms, again in amounts that vary with the holding time. Upon quenching the piece in iced brine, any untransformed austenite changes to martensite. By examination under the microscope, the metallographist can determine the amount of martensite and, therefore, the extent of the transformation that has occurred. By plotting on a diagram in which temperature is ordinate and time abscissa, curves like that shown in Fig. 10 are obtained. For convenience, time is plotted on a logarithmic scale.

The method of locating (*Please turn to page* 242)

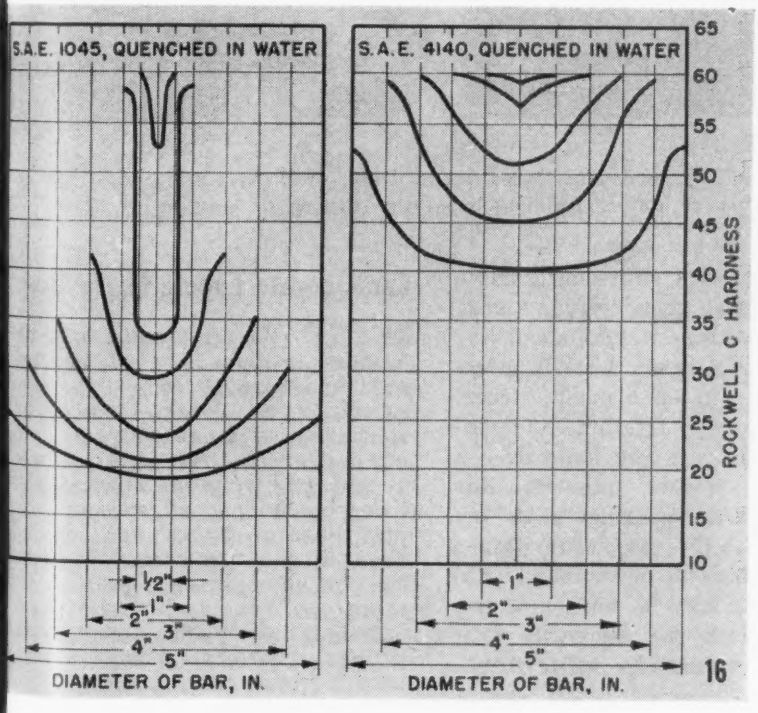


Fig. 15—Hardness vs. section in oil-quenched bars. *Modern Metallurgy for Engineers* by Frank T. Sisco

Fig. 16—Hardness vs. section in water-quenched bars. *Modern Metallurgy for Engineers* by Frank T. Sisco

QUESTIONS

Cutting or washing of sand spoils the surface . . . . . .
Run cupola daily . . . . . .
. . . . . **Core mix is strong**
Many ways available to degasify copper alloys . . . . . .

Sand Erosion Causes Trouble

QUESTION We have had complaint on gating procedure on one of our matchplates for producing small brass castings. Plate contains eight patterns, and method of gating is shown in Fig. 1. First castings poured were misrun at one side, and the next lot poured harder and hotter resulted in blemishes shown in Fig. 2. Comments and suggestions will be appreciated.

ANSWER Examination of the castings submitted indicates bad erosion in the sand ridge forming the deep groove of the cross formation on one side of the casting, which, according to the sketch, is molded in the drag. The sand washed out was carried to the cope side, resulting in the poor surface appearance in that area. Such erosion might be expected where the metal is poured hot and "hard" unless the sand is such that it will withstand that type of operation.

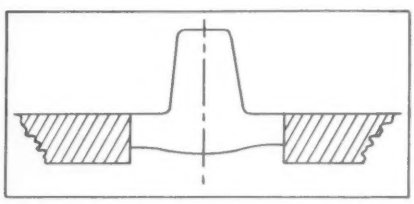


Fig. 1—Method of gate attachment

Your sketch indicates that the gate from the runner is about ¼-in. deep, and enters into the heavy grooved section, but no indication is made of the width. Perhaps it is too narrow, and caused the misrun on the far side of the thin section, leading to the idea of increasing the pouring temperature and harder pouring. However, if the gate also is ¼-in. wide, no trouble should have occurred from cold shuts at a temperature suitable for the thin section. It may be that on the first try the metal was on the cold side, resulting in the misrun, and on the second it was at the other extreme, too hot.

Possibly you are trying to pour too many molds with one crucible of metal. Our guess is that a gate of these castings weighs about 5½ lb, and about seven seconds is required to pour off a mold. Hence, it is advisable to determine the temperature drop in the ladle over a period of several minutes. For example, if the pouring range was 100° F, and the temperature drop in the ladle 50° per minute, then molds could only be poured for two minutes with the assurance that satisfactory castings would result.

With reference to the earlier statement about hard pouring and sand condition, it may be that the sand is somewhat weak—that is, lacking in bond—and the hard pouring resulted in a jet effect on the metal stream which cut or washed the comparatively soft sand at the point of contact. Or it might be that the sand is on the damp side or on the low side on permeability, and high temperature of the metal caused a boiling action in the area under the heaviest section—where the arms forming the cross are joined. Use of a vent wire and perforated bottom board might eliminate that trouble.

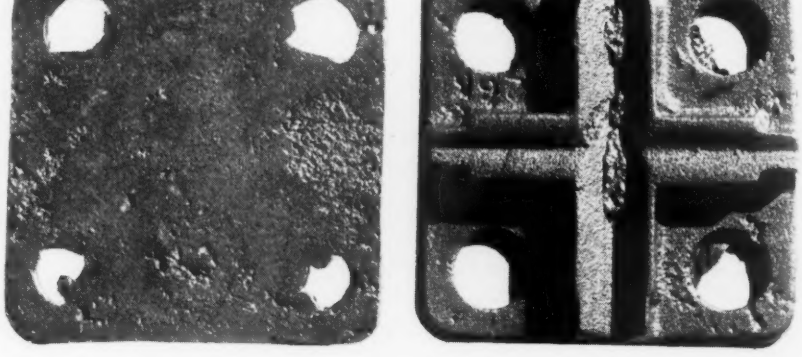


Fig. 2—Cope and drag faces, respectively, of brass casting showing the type of defect resulting from the cutting or erosion of sand

Can Operate Cupola Every Day

QUESTION We are producing in our foundry in Cuba five 12-ton iron rolls and 8 to 10 tons of smaller castings once a week. On occasion we have cast up to seven rolls in one day, once a week. Also we have poured four rolls on Tuesday and three on Friday; all with one cupola lined to 54 in. and melting about 10 tons per hour. We would like to know if it is possible to operate a cupola this size every day or if two cupolas are required, based on your observations. If castings were smaller, a smaller cupola more easily patched could be used, but in that case holding time would be too long.

ANSWER In the United States a number of foundries have only one cupola which is operated every day—some melting 15 or 20 tons per hour. However, they are melt-

ANSWERS

ing iron only in the afternoon, and the morning is spent in patching and charging. Length of time the cupola is in operation may vary from 1 to 4 hours depending upon the tonnage to be poured.

Usually when a cupola is operated only a few hours, the burnout of the lining is not too great, hence patching to bring it to the desired contour does not take very long. However, you indicate that considerable time is required in your case which of course would be true in an 8-hour operation. The best way to determine definitely how much burnout would occur, and the time required for patching, would be to run a few short heats.

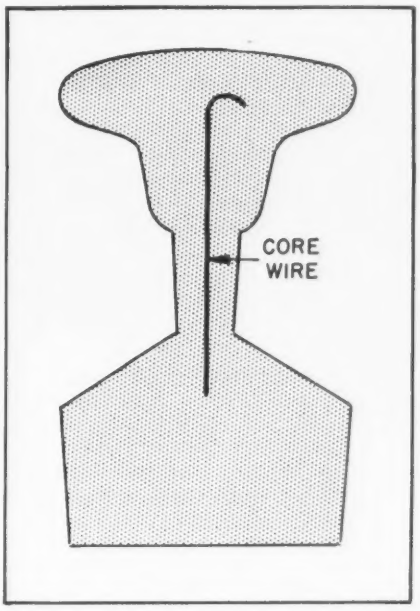
This would necessitate having sufficient molds set up to take care of the iron melted during the pouring period, and facilities to handle the molten metal. For example, if you could have one roll mold ready to pour each day and other molds to take about 3 tons of iron, the cupola could be operated for 1½ hours.

Core Practice Change Needed

We are making cast bronze door knobs and are having difficulty with core blows. Since the core stands up as indicated in the accompanying sketch, we have had to make a strong mixture of sand to prevent the ball top of the core from collapsing even though the stem is reinforced with wire. On one of the matchplates the gate enters the casting through the top of the knob, and on another through the stem. This does not seem to make any difference as they both blow, and we usually find the blows at the spot where the gate enters. We will appreciate a prompt reply as we want to place the job in production.

ANSWER We assume that your reference to the core standing up means that it is in that position while being baked, and the sand mixture would have to contain considerable green bond to prevent the relatively heavier ball portion from slumping or sagging down on the small stem portion. Your difficulty, as you intimate, is the combination of a large amount of gas created by the presence of comparatively large amount of binder, and no suitable exit for that gas.

Remedy, of course, is to reduce



Core baked standing up requires large print and excess of binder

the quantity of binders to the minimum, but to do that you will have to change your method of baking by using core driers which will permit the cores to lie horizontally rather than vertically as now practiced. When that change is made, it appears that you could reduce the size of the core print considerably—assuming that your sketch shows roughly the proportionate relationship of the several parts. Another suggestion would be to make the core in the shape of a dumbbell with one knob on each end of the stem; using a u-shape runner gating into the ends of the knobs.

Degasify Copper-base Alloys

QUESTION After reading "Things To Watch in the Nonferrous Foundry" by Hiram Brown in the August issue, it appears that some now are using dry nitrogen to degas copper-base alloys. As this is new to us, could you give further details? As oxygen forms a chemical compound with Cu, we cannot see how nitrogen can do much good. Also what is the normal amount of cuprous oxide to add to a melt previous to the addition of 1.5 oz of P-Cu per 100 lb metal? Is the oxide added at the start or finish of the melt?

ANSWER Some foundries are using dry nitrogen to degas Cu-base alloys, and according to Kurzinski in January, 1949 issue of FOUNDRY, about 8 cu ft per ton (0.4 cu ft per 100 lb) serves satisfactorily when zinc content is under 10 per cent. If Zn is higher, about 2 cu ft per ton is used since the gas also removes some of the Zn.

In a paper, "Melt Quality and Fracture Characteristics of Bronzes," by Shelleng, Upthegrove and Rote, *Transactions*, American Foundrymen's Society, 1951, mention is made of degassing *badly* gassed 88-8-4 alloy with 2.4 cu ft nitrogen per 50-lb melt with excellent results. They suggest pouring ¾ x 3 x 6-in. chill blocks to determine amount of nitrogen to eliminate gas holes. Nitrogen is admitted to molten bath through a porous graphite tube. Kurzinski states that degassing may be done before the metal reaches the pouring temperature, or by heating to 50° F above the pouring temperature, cutting off the flame and degassing.

It should be pointed out that gassing of Cu-base alloys as well as Al- and Mg-base alloys is attributed to absorption of hydrogen and not

oxygen. Action of nitrogen in removing the hydrogen is purely mechanical through formation of a large number of small bubbles to which those of hydrogen become attached and are removed.

In an article in the September, 1953 issue of FOUNDRY on degassifying with copper oxide it was pointed out that cupric oxide (black) contains about 20 per cent oxygen while cuprous oxide (red) contains about 11 per cent; and due to the higher oxygen content many foundrymen prefer the black variety, using 1 lb per 100 when in trouble with gassing, and 4 to 8 oz as a safety measure. For the cuprous (red) oxide the amounts would be 1 lb 13 oz, and 7½ to 14½ oz per 100 lb of molten metal. Deoxidizing then is accomplished with 1.5 oz P-Cu per 100 lb metal.

Copper oxide may be added to the metal in several ways, all of which appear to be effective. One method is to add the oxide with the charge and melt. Another is to partially melt the charge, skim, and add the exide. Third method is to melt the charge completely, add the oxide enclosed in copper foil or a phosphorizer cup to plunge beneath the surface. Stir well, skim and deoxidize with phosphor-copper.

Finds Holes in Drag Portion

QUESTION We are enclosing two gray iron castings representative of porosity defects we are having. This porosity seems to be confined to the drag section although it works up into the cope at times. It seems to prevail in the heavier sections and occurs with and without cores. Castings with cores are affected at the print areas. For example, in a disk spacer spool porosity shows up at each end, working up from the drag and out around the core prints. We have tried to eliminate such causes as wet sand, wet ladles and cupola spout, etc. Iron is not on the cold side. We have tried cold iron in wet sand and the defects do not appear. Pouring iron on the hot side in sand on the dry side causes the defect to appear. We use 100 per cent scrap but not stoveplate; analysis is normal. Is it possible that this defect comes from binding materials such as seacoal or pitch? We use western seacoal.

ANSWER While your description of the defects encountered and examination of the specimens submitted present some puzzling aspects, we suspect that they arise from inability of gas to escape from the drag section of the mold. The fact that the trouble essentially is located in the drag and your mention of care taken to avoid dampness in ladles, etc., appear to eliminate the presence of gas in the metal, since the latter usually shows up on the cope side.

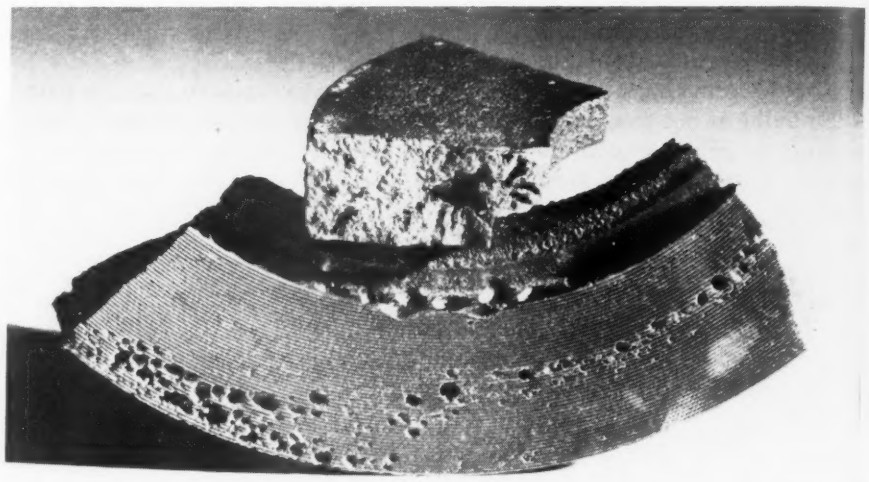
Possible causes are use of tight bottom boards or ramming a little too hard. Mention that use of cold iron and wet sand prevents the defect, and use of hot iron and dry sand causes it, indicates a borderline case. Cold iron and wet sand cause the iron to freeze or solidify rapidly while hot iron and dry sand have the opposite effect and permit penetration of gases since the metal remains fluid longer.

First remedial step suggested is to examine the possibility of tight bottom boards. Scratching suitable vents across the mold to the edges will provide channels for the escape of gases. If that does not minimize the trouble, apply the vent wire adequately in the affected areas and see what results are obtained.

There is a possibility that you have too much organic material in the sand. Those materials generate gases, of course, but we believe that if excessive amounts were present, the holes would appear all over the castings rather than be confined to some areas as shown in the illustration.

Addition of Sodium Carbonate

QUESTION In the August, 1952 issue of FOUNDRY an article on refractory permanent molds appeared which mentioned use of silicon carbide with bentonite. We tried some experiments, using crushed silicon carbide grinding wheels so that all material passed through a 40-mesh sieve. To that 5 per cent bentonite was added, and the mixture was made into a plastic mixture by slowly adding sodium carbonate solution (400 cc water containing 90 grams sodium carbonate). Mixture was placed in a flask 6 x 6 x 3 in. Mold was air dried for 30 hr before baking, but we found that the material did not dry after keeping for a long period. Can you tell us where we are wrong?



Small holes on drag section of gray iron casting make appearance after a machining operation is performed on that particular area

ANSWER Check of the article on refractory permanent molds shows that with the particular formulation a British patent is involved. We do not have access to that patent so do not know the exact combination of materials employed. We suggest that you look into that angle before proceeding too far with your experiments.

However, we suspect that you used too much sodium carbonate. It has been found that additions of small amounts of sodium carbonate, sodium hydroxide, etc., to bentonite and clay-bonded sands in many cases improve some of the properties of the sand such as green and dry strength, permeability, flowability, etc., but not necessarily all or at the same addition.

Usually the amount of sodium

(*Concluded on page* 132)

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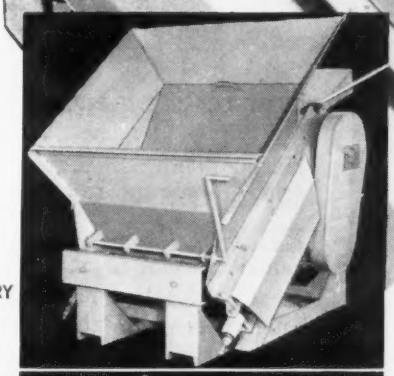
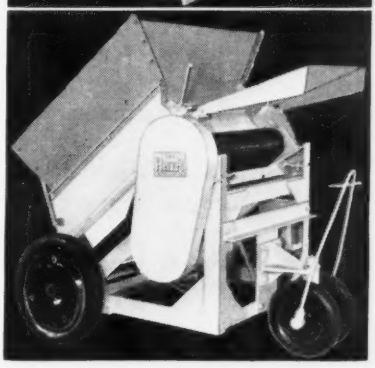


STATIONARY MODEL NYS-E



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(*Concluded from page* 130)

carbonate or other agent added is based on the pH or hydrogen ion concentration of the sand. Work by Booth indicated a maximum addition of 1 per cent addition of sodium carbonate by weight to the sand, which happened to be natural molding sands containing around 20 per cent clay. In the case of bentonite bond, the amount to be added would be considerably less due to lower amount of bond—for example, in your case 5 per cent.

While you mention use of 5 per cent bentonite and 400 cc of water containing 90 grams of sodium carbonate, nothing is said about the total amount of material, and one can only make a guess as to possible relationships. If it is assumed that all of the water was used to bring the mix to a plastic state, resulting in a 4 per cent moisture content, then the total weight would be 10,000 grams. That would contain the 90 grams of sodium carbonate or 0.9 per cent. However, since the mix contains only 5 per cent bond instead of 20, the sodium carbonate addition is about four times what it should be.

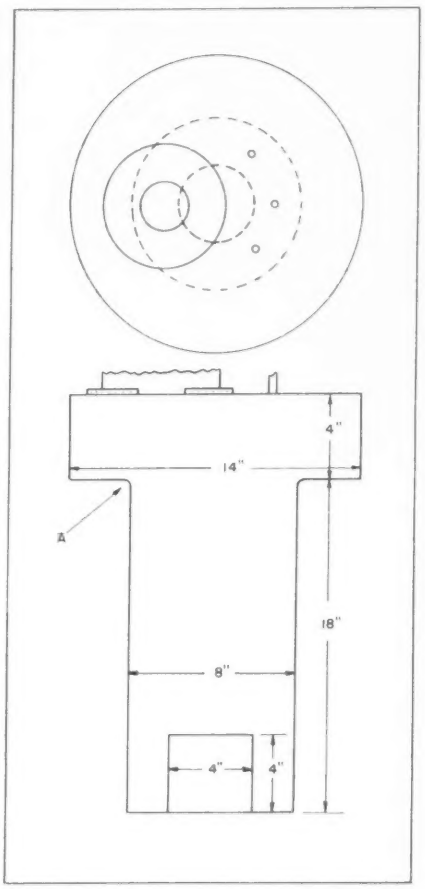
As indicated, this is only guesswork. To obtain a satisfactory answer you will have to determine the pH or hydrogen ion concentration of the sand mix without any sodium carbonate addition, and then add sufficient of that material to bring the sand to the pH level to provide the desired property changes.

Mold the Casting Big End Up

QUESTION Shrinkage in vital parts of a ram head gray iron casting is causing considerable trouble. For this 280-lb casting we use our regular iron mixture containing 2.25 to 2.50 per cent silicon. We use about 30 per cent scrap in the charge and add about 5 per cent steel clippings to the metal in the ladle. The iron is cooled before it is poured. The mold is gated at the bottom, with two risers on top and three blind risers at the side of the large part at the bottom. We are thinking of adding 2 per cent nickel and of placing chills in the mold, one set outside at the junction of high and low parts of the casting, and another set in the cored hole at the top.

ANSWER The basic idea is fairly satisfactory, provided—and this is the important feature—that the risers are large enough. In our opinion, based on a knowledge of the average foundryman's natural desire to hold volume of gates and risers to a minimum, your present risers are too small and therefore do not function properly.

It may be that you have no choice in position of the casting in the mold. In the event that you have a choice, we suggest you reverse the position. In some instances bottom pouring is satisfactory. In the present instance it is not; it interferes with directional solidification. At the end of the pouring period the hottest metal and the hottest part of the mold are on the bottom. The coldest metal is at the top and therefore does not feed properly.



Casting is top-gated and risered

One factor in the shrinkage problem causes the metal in a casting to shrink toward a common center. A second and more important factor, the law of gravity, draws the metal downward. When a casting is stripped it no longer is in contact with the cope face, or with the sides of the mold, but most certainly it is resting solidly on the bottom of the mold.

Our suggestion is to make the mold big end up. Gate it on top through three or four small pop gates approximately over the center. Place one 6-in.-diam riser 8 in. high either on top or at one side. Connect the top riser to the casting by a 2-in. opening through a thin core. Side riser is connected to the casting by one or two openings through a thin core. The sand shoulder *A* in the accompanying illustration, where the two parts of the casting come together, should be vented with a wire to prevent the iron in the vicinity from kicking or boiling. Turbulence of this kind accentuates shrinkage defects.

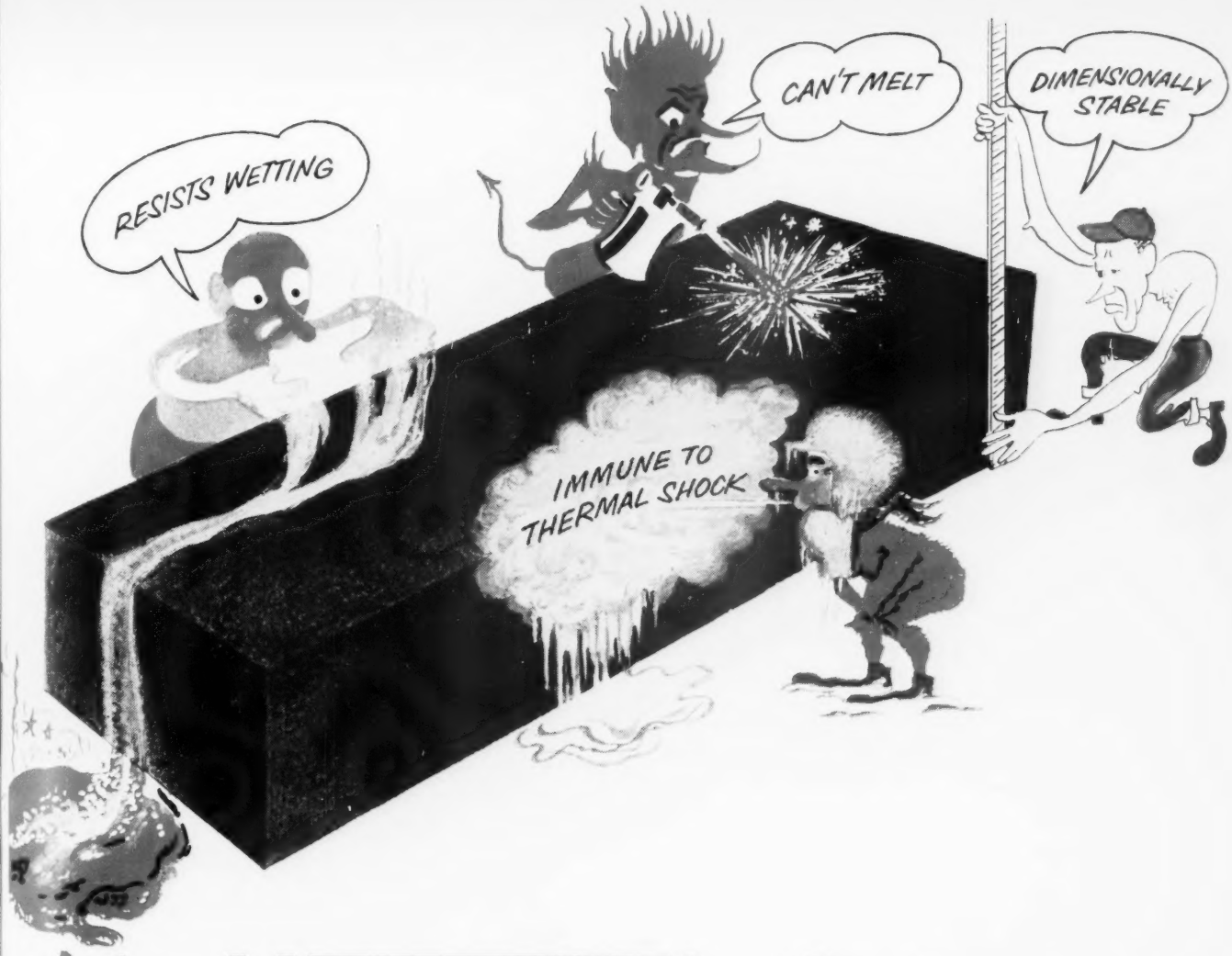
Reverting for a moment to your present method, a possibility exists that the mold is not sufficiently rigid to resist the static pressure under a high head. With the mold yielding around the large disk, and with the risers frozen, the metal in the upper part of the mold does not flow down readily and the result is a series of cracks and draws at the junction of the two parts of the casting. If the casting is broken, similar defects will be found more or less all through this horizontal area.

Spot Testing Identification

QUESTION Is there any method of distinguishing manganese bronze from aluminum bronze?

ANSWER Some time ago the National Bureau of Standards developed a spot test method to distinguish between aluminum bronze and manganese bronze when these metals have been separated from other types of nonferrous scrap.

Procedure is to spray a small amount of sulphuric acid (one part concentrated acid to two parts water by volume), and then place one drop of a mercury solution on the sprayed portion. The latter solution is made by dissolving 4 grams mercuric chloride and 4.5 grams ammonium thiocyanate in 50 cubic centimeters of water, and then adding 0.01-gram silver nitrate and 0.75-gram ammonium persulphate. With manganese bronze a characteristic grayish purple spot is developed while with aluminum bronze the spot is greenish yellow.



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Men of Industry

BERNARD N. AMES, elected chairman of the Metropolitan Chapter of the American Foundrymen's Society for 1953-54, is supervising physical metallurgist, Material Laboratory, New York Naval Shipyard, Brooklyn, N. Y. Mr. Ames was graduated and received his master's degree in metallurgy from University of Alabama. In 1940 he joined the material laboratory at the Naval Shipyard, and for 12 years has been head of the casting development and foundry practices section. Mr. Ames has served as consultant to many ferrous and nonferrous foundries. Active in many technical organizations, he is serving this year as chairman of the Brass and Bronze Division of the AFS. He served as the vice chairman of the Metroplitan Chapter last year.

♦ ♦ ♦

Paul B. Brown, until recently vice president of the bonded products and abrasive grain division, Carborundum Co., Niagara Falls, N. Y., has been appointed vice president-general manager, Peninsular Grinding Wheel Co., Detroit. Mr. Brown was associated with Norton Co., Worcester, Mass., for 23 years.

♦ ♦ ♦

P. C. Haldeman has been named works manager of the Foote Construction Equipment Division, Blaw-Knox Co., Pittsburgh, at division headquarters in Nunda, N. Y. **H. C. Stirling,** since 1951 production superintendent in charge of castings at the company's Lewis Machinery Division in Groveton, Pa., has succeeded Mr. Haldeman as general superintendent at the Rolls Division in Pittsburgh. Mr. Haldeman, a graduate of Pennsylvania State College, joined the company's Lewis Machinery Division 10 years ago and became plant superintendent there in 1948. The following year he was transferred to the Rolls Division as assistant general superintendent. Mr. Stirling, with the company 21 years, began as a patternmaker at Lewis Machinery Division, where he became foreman and superintendent of the pattern shop, and general foundry superintendent.

♦ ♦ ♦

A. R. Abelt, formerly vice president of field forces, Chain Belt Co., Milwaukee, has been named vice president-sales. **George W. Woodland,** until recently sales manager of the Chain and Power Transmission Division, has been appointed manager of field forces for the industrial divisions. **Gilbert J. Schuelke,** assistant sales manager of the Chain and Transmission Division, has become sales manager of that division. **William C. Messinger,** assistant to the manager of the Construction Machinery Division, has been elected secretary of the company, succeeding **George D. Gilbert,** who has retired. **Edward M. Rhodes** has been given Mr. Gilbert's former duties as manager of the Baldwin-Duckworth Division, and **Roland V. Poisson,** formerly assistant sales manager has been made sales manager of Baldwin-Duckworth Division. **R. V. Krikorian** has been named manager of the Chain Belt Ordnance Division

♦ ♦ ♦

Judson Neff has been named manager of manufacturing and production operations in the Pittsburgh and Midland, Pa., plants of Mackintosh-Hemphill Co., succeeding **Robert G. Neilson,** who has assumed a part-time liaison position between the company's manufacturing and sales departments. Mr. Neff has been associate professor of production in the School of Business, University of Chicago.

♦ ♦ ♦

William J. Grede, president, Grede Foundries Inc., Milwaukee, has been named a director, J. I. Case Co., Racine, Wis.

♦ ♦ ♦

Eldo Finley has been appointed general superintendent in charge of operations, San Francisco Iron Found-

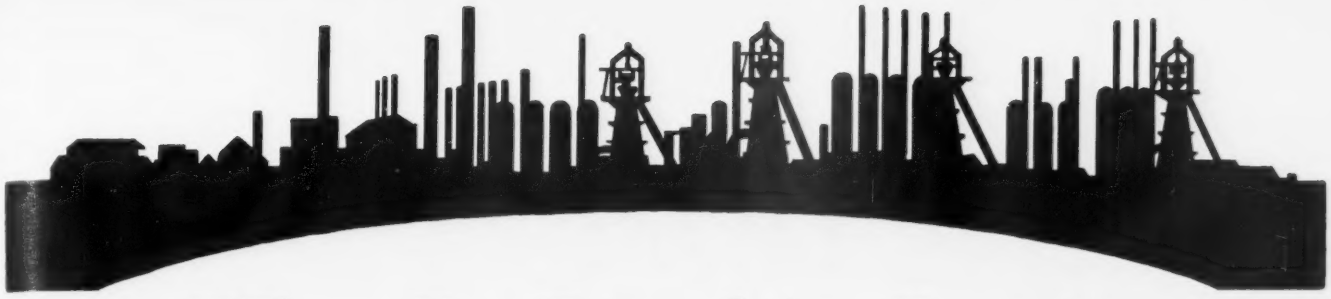
(Continued on page 136)

BERNARD N. AMES
. . . heads Metropolitan Chapter

PAUL B. BROWN
. . . Peninsular vice pres.

P. C. HALDEMAN
. . . Blaw-Knox works manager

H. C. STIRLING
. . . Blaw-Knox superintendent



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(*Continued from page* 134)

ry, San Francisco, succeeding **R. C. Noah** who has resigned. With the company 28 years, Mr. Finley has been largely responsible for design of abrasive non-slip surface castings developed by the San Francisco foundry.

♦ ♦ ♦

R. E. Bansemer has been appointed sales manager, Parsons Co., Newton, Iowa, subsidiary of Koehring Co., Milwaukee, succeeding **M. O. Messenger,** who has assumed Mr. Bansemer's duties as assistant sales manager of Koehring Co. Mr. Bansemer joined the parent company in 1923 and was engaged in production, service and sales until 1950 when he became assistant sales manager. Mr. Messenger has been with Parsons since 1939 in purchasing, service and sales work.

♦ ♦ ♦

Charles E. Greenlee, research engineer, has been named assistant to the vice president of sales, Basic Refractories Inc., Cleveland, where he will assist in development projects for new applications of basic granular refractories produced at the company's Gabbs, Nev., and Maple Grove, O., facilities. Mr. Greenlee joined the company 3 years ago following graduation from Ohio State University.

♦ ♦ ♦

David Walters has been appointed chief industrial engineer, Bohn Aluminum & Brass Corp., Detroit. A graduate of Massachusetts Institute of Technology, Mr. Bohn until recently was associated with Detroit Aluminum & Brass Corp., Detroit.

♦ ♦ ♦

Hugh J. Richardson has been named works manager, Brabant Brass Mfg. Co., Detroit, where he will be responsible for manufacturing operations of the company. For 10 years Mr. Richardson has been factory manager, Penberthy Injector Co., and previously was associated with Continental Motors, Muskegon, Mich.

♦ ♦ ♦

Charles E. Zanders has been appointed senior process engineer, Superior Steel & Malleable Castings Co., Benton Harbor, Mich., where he will be responsible for tool design of the machining and assembly division and will work on mechanization problems in the steel and malleable iron foundries. Mr. Zanders, a graduate of Tri-State College, was formerly associated with Bendix Aviation Corp., South Bend, Ind.

♦ ♦ ♦

Donald K. Martens has been appointed sales engineer, Hydro-Blast Corp., Chicago, in Michigan, Ohio and West Virginia. Mr. Martens received his master's degree in engineering at General Motors Institute. He was previously associated with Central Foundry Division, Saginaw, Mich.; Campbell, Wyant & Cannon Foundry Co. and Continental Motors Corp., Muskegon, Mich.

♦ ♦ ♦

Harold G. Haines has joined Woodruff & Edwards Co., Elgin, Ill., as metallurgist. Mr. Haines has been associated with Howard Foundry Co., Chicago, in that capacity, for 7 years.

♦ ♦ ♦

John E. Wolf, chairman of the Central Michigan Chapter of the American Foundrymen's Society for 1953-54, is manager of the Gray Iron Division, Midwest Foundry Co., Coldwater, Mich. Mr. Wolf joined the company in 1938 as office manager and supplemented his work with night courses in mechanical engineering and accounting. Following two years of service with the Naval Air Corps he returned to Midwest in 1945 and after six months as sales representative, became manager of the Gray Iron Division. Mr. Wolf was vice chairman of Central Michigan Chapter last year.

♦ ♦ ♦

Bernard E. Speranza has been appointed engineer in the carbide materials development section, Carboloy Department of General Electric Co., Detroit. Mr. Speranza, a graduate of Carnegie Institute of Technology, has been in GE's chemical and metallurgical training program. **Roy C. Nichols** has joined Carboloy's metallurgical and process quality control unit for permanent magnet materials at the Edmore, Mich., plant. Mr. Nichols was graduated from University of Michigan, and was formerly with Diesel Equipment Division, General Motors Corp., Grand Rapids, Mich.

♦ ♦ ♦

William C. Corbeau, until recently melting superintendent, National Malleable & Steel Castings Co., Cleveland works, has been transferred to the Chicago works to assist in melting operations there. Mr. Corbeau has been with the company over 31 years.

♦ ♦ ♦

A. C. Richardson, for the past 20 years supervisor in charge of research in mineral processing, Battelle Memorial Institute, Columbus, O., has been named technical director of that department. A graduate of University of North Dakota, Mr. Richardson received his master's degree in mining from University of Washington. Prior to joining Battelle in 1933 he was associated with Pacific Coke & Coal Co., Seattle, Colorado Fuel & Iron Co., Pueblo, Colo., and the Bureau of Mines.

♦ ♦ ♦

William N. Mullane, since 1946 assistant superintendent, Ideal Foundry Division, Republic Steel Corp., Newton Falls, O., has been appoint-

(*Continued on page* 138)

HUGH J. RICHARDSON
. . . Brabant Brass works mgr.

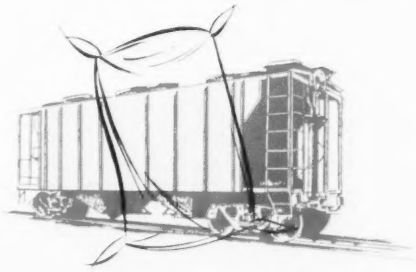
JOHN E. WOLF
. . . AFS chapter chairman

A. C. RICHARDSON
. . . Battelle technical director

WILLIAM N. MULLANE
. . . Republic Steel plant supt.

OTTAWA

SILICA SANDS



WHETHER A BAG, OR A CARLOAD, OTTAWA'S QUARTZITE PRODUCTS RETAIN THEIR CONSTANT QUALITY AND UNIFORMITY. CONTINUOUS LABORATORY TESTING MAINTAINS AN OUTPUT THAT IS 99.89% PURE!

In our swiftly moving economy, time is bought and paid for with hard dollars and cents. At Ottawa Silica Company, we know that prompt service along with top quality in our own product, are essential in helping the foundry man perform his job with greatest efficiency. When you buy silica sand, think of Ottawa's quality standards and how they work for you to produce finer castings in less time with less loss.

OTTAWA
SILICA COMPANY
PLANTS LOCATED AT
OTTAWA, ILL. AND ROCKWOOD, MICH.

SERVING THE FOUNDRY, GLASS, AND CERAMIC INDUSTRIES FOR OVER 50 YEARS

(*Continued from page* 136)

ed superintendent, succeeding the late J. C. Miller. Mr. Mullane attended Youngstown College and joined Republic in 1933 as a field engineer in the Warren, O., district. In 1942 he was made industrial engineer at the Ideal Foundry Division.

♦ ♦ ♦

Roy C. Hobson has been named assistant manager of the Chicago works, National Malleable & Steel Castings Co., Cleveland. **Mark M. Miller** has succeeded Mr. Hobson as assistant to the vice president in charge of sales, Cleveland. **John H. Murphy** has assumed Mr. Miller's former duties as sales manager at the Indianapolis works and **John A. Koehl** has been appointed assistant sales manager there. Mr. Hobson, a graduate of University of Maine, joined National Malleable 25 years ago, and held positions in railway road service, inspection, engineering and sales, serving as assistant sales manager in Chicago until 1947 when he was transferred to Cleveland. Mr. Miller was graduated from Carnegie Institute of Technology and has been with the company since 1941. He was personnel manager at Chicago works for 5 years prior to going to Indianapolis. Mr. Murphy became associated with the company in 1930, Mr. Koehl in 1933.

ROY C. HOBSON
. . . *National Malleable, Chicago*

MARK M. MILLER
. . . *National Malleable, Cleveland*

JOHN H. MURPHY
. . . *Naco plant sales manager*

JOHN A. KOEHL
. . . *assistant sales mgr., Naco*

♦ ♦ ♦

B. C. Waite, vice president and a director, Grede Foundries Inc., has retired. **James J. Ewens,** vice president-manufacturing, and **John W. Perry Jr.** vice president-sales, have been made directors.

♦ ♦ ♦

John L. Ham, for the past year project manager in charge of physical metallurgy, National Research Corp., Cambridge, Mass., has been appointed director of the metallurgical research department, succeeding **James H. Moore,** who has become general manager of the company's subsidiary, Vacuum Metals Corp.

♦ ♦ ♦

Mel E. Buechel, graduate of Lane Technical High School, Chicago, has received the first annual scholarship offered by National Malleable & Steel Castings Co., Cleveland, for study at Illinois Institute of Technology. Mr. Buechel will use the one-year grant for study in electrical engineering.

♦ ♦ ♦

William A. Geisler has joined the staff of Lester B. Knight & Associates, Chicago. A specialist in shell molding, Mr. Geisler has had 26 years of experience in foundry operating, research and development experience in the United States and Germany. He was previously associated with Western Foundry Co., Chicago; Eastern Steel Castings Co., Newark, N. J.; Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich., and Homer Foundry Corp., Coldwater, Mich., as well as several foundries in Germany.

♦ ♦ ♦

Dr. Raymond W. McNamee has been appointed manager of research administration, Union Carbide & Carbon Corp., New York, where he will co-ordinate research activities of all the corporation laboratories. **Dr. Franklin Johnston** has succeeded Dr. McNamee as superintendent of the research and development department of Carbide & Carbon Chemicals Co., division of Union Carbide. **Dr. Henry C. Chitwood** has been named assistant director of organic chemical research.

♦ ♦ ♦

Burton G. Ebbeson and **Charles M. Wellons** have been appointed field engineers, Norton Co., Worcester, Mass. Mr. Ebbeson, whose headquarters will be at the company's main plant, will work in the Worcester area. A graduate of Brown University, he joined the company in 1936 and has worked in manufacturing control, research and development and sales engineering. Mr. Wellons, a graduate of Lehigh University, has been with Norton 3 years in the sales engineering department. He will work out of the Philadelphia district office.

♦ ♦ ♦

John W. Pennington, since 1952 executive engineer, Metal Products Division, Koppers Co., Pittsburgh, has been named manager of the division's new technical department where he will supervise laboratory and product development activities, including control of melting and heat treating. Mr. Pennington joined Koppers in 1950 as chief engineer of the division's piston ring department. Previously he was associated with Caterpillar Tractor Co., Peoria, Ill.

♦ ♦ ♦

J. W. Bonnet has been named administrative assistant to the vice president, Whitehead Metal Products Co., New York. Mr. Bonnet was formerly New York office sales manager and head of the aluminum and foundry departments. **J. J. Fitzgibbons** has been made manager of the foundry department, handling Inco nickel and Vanadium foundry alloys. **F. R. Van Valkenburg** has become manager of the aluminum department handling Alcoa aluminum alloys.

♦ ♦ ♦

Chester A. Warner has been named chairman of the board, Precision Scientific Co., Chicago, succeeding the late Walter W. Pitann, founder of the company. **John J. Kinsella** has succeeded Mr. Warner as president. **Arthur Pitann** has been appointed to Mr. Kinsella's former office of vice

(*Continued on page* 140)

*"How do I choose the **BEST** charging method?"*

Let an experienced Whiting foundry engineer advise you regarding the charging system best suited to your requirements. He'll study your plant and yard layout. He'll consider the size of your foundry, size and number of cupolas, type of scrap used, coke ratio, coke quality, minimum and maximum hourly tonnages, molten metal temperature, and many other factors that influence the choice of charging methods.

The result will be a practical recommendation that will fit your needs and reduce costs.

This service of the Whiting engineering department is available to you without cost or obligation. Write and request it now!

WHITING CORPORATION
15607 Lathrop Avenue, Harvey, Illinois

Manufacturers of a complete line of foundry equipment

(*Continued from page* 138)

president-secretary. **George E. Bader** has become vice president-manufacturing, and **Edmond E. Tice,** vice president-finances.

♦ ♦ ♦

G. N. Dow, formerly Detroit representative, Leschen Wire Rope Division, H. K. Porter Co., St. Louis, has been appointed sales manager of the Chicago district, which includes northern Illinois, Iowa, Wisconsin, northern Indiana, Michigan and Minnesota.

♦ ♦ ♦

William Rodgers has been named vice president-general sales manager, Blaw-Knox Co., Pittsburgh. Prior to joining Blaw-Knox in April as general sales manager, Mr. Rodgers was in the motor transport industry. He is a director of Granite City Steel Co., Granite City, Ill.

♦ ♦ ♦

W. R. Holeton, recently elected chairman of the British Columbia Chapter of the American Foundrymen's Society, for 6 years has been assistant metallurgist with the British Columbia Research Council, University of British Columbia, Vancouver. He has recently joined the teaching staff of the Vancouver schools. Mr. Holeton was graduated from University of Alberta. He was vice chairman of the British Columbia Chapter last year.

♦ ♦ ♦

William A. Ruppel, export manager, Simonds Abrasive Co., Philadelphia, was recently honored by the company upon completion of 50 years of service.

♦ ♦ ♦

Leo L. Gill has been appointed manager of the technical sales department, Harbison-Walker Refractories Co., Pittsburgh. Mr. Gill attended Notre Dame University and since 1923 has been in the company's engineering and technical sales departments.

♦ ♦ ♦

George R. Holmes, president, McLagon Foundry Co., New Haven, Conn., has been named a director of the Manufacturers' Association of Connecticut.

♦ ♦ ♦

F. R. Schulz has been appointed field engineer, Lamson Corp., Syracuse, N. Y., to handle the company's line of conveyors, pallet loaders and blowers in the Detroit area. Mr. Schulz previously was associated with Mechanical Handling Co., and Palmer-Bee Co., both of Detroit. He is a graduate of Acadia University, Nova Scotia.

WILLIAM RODGERS
. . . Blaw-Knox vice president

F. R. SCHULZ
. . . Lamson sales, Detroit

A. G. TRIVISON
. . . joins Sly Mfg. Co.

EDWARD J. CURTIN
. . . Barber-Greene sales

A. G. Trivison, formerly assistant manager of sales, Industrial Ovens Inc., Cleveland, has been appointed manager of the Industrial Oven Division, W. W. Sly Mfg. Co., Cleveland. Mr. Trivison attended Ohio State University and has been associated with design and sale of industrial ovens since 1937.

♦ ♦ ♦

G. W. Ballantine has joined Armour & Co., Chicago, as manager of its coated abrasives department, Alliance Division, Alliance, O. Mr. Ballantine will supervise sales, promotion, buying and research functions.

♦ ♦ ♦

Jack Sertain has been appointed Atlanta representative, Catalin Corp. of America, New York, handling the company's line of resins and molding compounds out of the Greensboro, N. C., office.

♦ ♦ ♦

Frank C. Shaner has been appointed sales service representative in Cleveland territory for Richard C. Remmey Son Co., where he will handle the company's line of clay and silicon carbide refractories. Mr. Shaner formerly was in the Philadelphia area.

♦ ♦ ♦

Austin Goodyear, for the past year general manager of the rubber and conveyors divisions, Hewitt-Robins Inc., Stamford, Conn., has been made a vice president. Mr. Goodyear joined the company in 1941 and became production manager of its Passaic, N. J., plant in 1947.

♦ ♦ ♦

Edward J. Curtin has been appointed district sales manager, Barber-Greene Co., Aurora, Ill., with headquarters in Boston, in the territory comprising New England, New York state and part of New Jersey. Mr. Curtin, a graduate of Holy Cross College, has been engaged in sales and field work for the company since completion of military service in Army Corps of Engineers. **Earle F. Lamprey,** formerly New England sales manager, has been transferred to the New York office where he will engage in export activities. Mr. Lamprey succeeded his father on his retirement as sales representative for Barber-Greene in Boston.

♦ ♦ ♦

John R. Snowball, until recently associated with the Portland Cement Association, Columbus, O., has joined Marietta Concrete Corp., Marietta, O., as consulting engineer. A graduate of Purdue University, Mr. Snowball's entire career has been in the concrete industry.

♦ ♦ ♦

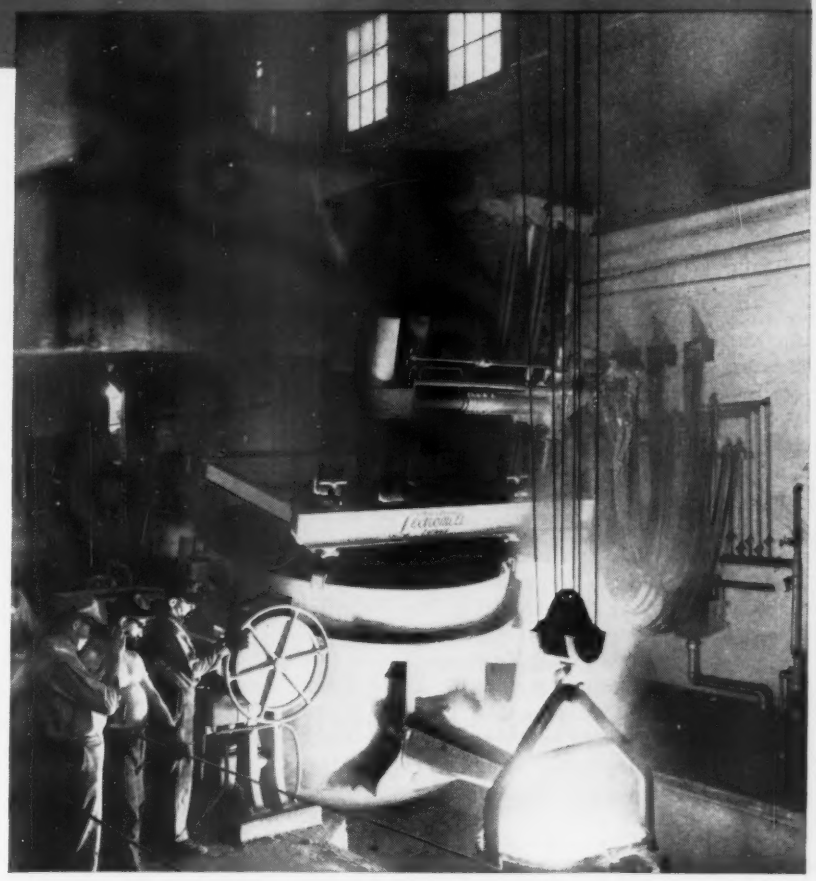
Guy Pitts, formerly manager of the forging and brass mill plants, Bohn Aluminum & Brass Corp., Detroit, has been named manager of the company's Brass and Bronze Division.

(*Concluded on page* 142)

if you judge a furnace on performance...

For 32 years Empire Steel Castings, Inc., has depended on this Lectromelt Furnace. Rated at 1½ tons, it consistently pours 2½ to 3-ton heats.

New 5-ton Lectromelt Furnace at Empire pours a high-quality stainless-steel heat.



A rugged, 32-year-old Lectromelt* Furnace still works full time at Empire Steel Castings, Inc., Reading, Pa. Empire says, "It's as good as the day it started. Better, in fact, because we found we could pour additional power to it, so we get heats out faster than we first dared to."

On the basis of the performance and reliability of Empire's old furnace, they recently bought a new 5-ton, top-charging Lectromelt. Now they get much closer temperature and chemical control. And new, pin-point analysis control enables them to duplicate uniformity and high grade of molten metal in lot after lot of stainless.

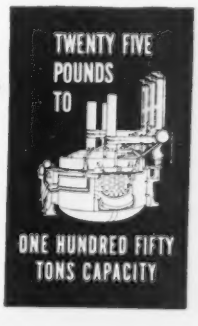
Lectromelt Furnaces will boost your performance record and add to the quality of your metal. Write for catalog #9 describing them in detail. Pittsburgh Lectromelt Furnace Corporation, 314 32nd Street, Pittsburgh, Pennsylvania.

Manufactured in . . . CANADA: Lectromelt Furnaces of Canada, Ltd., Toronto 2 . . . ENGLAND: Birlec, Ltd., Birmingham . . . FRANCE: Stein et Roubaix, Paris . . . BELGIUM: S. A. Belge Stein et Roubaix, Bressoux-Liege . . . SPAIN: General Electrica Espanola, Bilbao . . . ITALY: Forni Stein, Genoa. JAPAN: Daido Steel Co., Ltd., Nagoya

*REG. T. M. U. S. PAT. OFF.

MOORE RAPID

WHEN YOU MELT... *Lectromelt*



DWAIN RICHEY
. . . tractor sales, Hough

JACK C. BEVER
. . . Frank G. Hough sales

C. C. LAY
. . . Controllers' vice pres.

JOSEPH C. HUEHN
. . . Controllers' director

(*Concluded from page* 140)

and Michigan Smelting and Refining Division **Frank Turnbull** has been appointed buyer of scrap material for Michigan Smelting and Refining Division.

♦ ♦ ♦

Jack C. Bever and **Dwain Richey** have been appointed district representatives, Frank G. Hough Co., Libertyville, Ill., to supervise sales of tractor shovels and tractors. Mr. Bever, a graduate of Illinois Institute of Technology, will cover District of Columbia, Maryland, Virginia, West Virginia and the Carolinas. Mr. Richey, who was graduated from Iowa State College, has been assigned to Arkansas, Louisiana, Oklahoma, Texas and New Mexico.

♦ ♦ ♦

Edward K. How has been named manager of welding department sales, General Electric Co., Schenectady, N. Y. Mr. How joined the company in 1929 following graduation from Dartmouth College. He previously served in company offices in Bridgeport, Conn., Chicago and New Orleans, more recently with the Locke Department, Baltimore, where he has been sales manager since 1947.

♦ ♦ ♦

Alfred Halliday has been appointed sales representative, C. B. Hunt & Son Inc., Salem, O., to handle its line of air and hydraulic control valves in Kentucky, central and western Tennessee, northern Mississippi and Arkansas.

♦ ♦ ♦

Alex H. Homberger was named executive vice president in charge of foundry development and consulting activities for U. S. Engineering & Mfg. Co., Chicago.

♦ ♦ ♦

Arthur E. LeGare, formerly associated with General Steel Castings Corp., Granite City, Ill., has joined Orton Crane & Shovel Co., Chicago, as sales engineer.

C. C. Lay, treasurer, the Wheland Co., Chattanooga, Tenn., was recently elected a vice president and director of Controllers Institute of America, New York. Mr. Lay was president of the Chattanooga Control in 1950-51. **Joseph C. Huehn,** controller, National Bearing Division, American Brake Shoe Co., St. Louis, was also elected a director of the institute. Mr. Huehn was president of the St. Louis Control in 1947-48.

♦ ♦ ♦

Donald W. B. Kelley has been appointed assistant to **A. F. Hitchiner,** in national sales of precision investment castings produced by Hitchiner Mfg. Co., Milford, N. H., with headquarters at its principal sales office in West Hartford, Conn. Mr. Kelley, a graduate of University of Michigan, was previously associated with Ford Motor Co., A. O. Smith Corp., Milwaukee, and Edwin L. Wiegand Co., Pittsburgh. For the last two years he was a manufacturers' representative in Pittsburgh, for various casting producers including Hitchiner Mfg. Co.

♦ ♦ ♦

Charles I. Taggart, until recently acting chief engineer, Ney Mfg. Co., Canton, O., has been made head of development and research, Canton Malleable Iron Co. After graduation from Swarthmore College in 1937, Mr. Taggart was associated with General Electric Co. for 4 years. Later he spent 11 years with Hercules Motors Corp., Canton.

♦ ♦ ♦

C. A. Brashares and **Richard S. Moore** have been named assistant general sales managers for Harbison-Walker. **George M. Ullom** is sales manager in Birmingham, and **Joseph D. Custer** sales manager in Portsmouth, O.

♦ ♦ ♦

J. C. Linsenmeyer, since 1951 vice president of manufacturing, has been elected president, American Blower Corp., Detroit, succeeding the late Clark T. Morse. **John W. Brennan,** formerly chief engineer, has been named vice president of engineering.

♦ ♦ ♦

Fred F. Van Atta has been appointed special assistant on the headquarters staff, American Society for Testing Materials, Philadelphia, where he will be engaged in developmental and promotional activities. A graduate of Michigan State College, Mr. Van Atta was recently manager of the building division, Carolinas Branch, Associated General Contractors.

♦ ♦ ♦

Roy W. Schroeder, assistant professor, foundry and pattern laboratory, Navy Pier Branch, University of Illinois, Chicago, has been advanced to associate professor. With start of the fall term in September, he has been directing foundry and pattern shop instruction and operation of the laboratory.

♦ ♦ ♦

Philip de Veau has been appointed sales engineer in Wisconsin for Sterling Abrasives Division, Cleveland Quarries Co., Tiffon, O. Mr. de Veau was previously a manufacturer's agent for M. B. Austin Co., Northbrook, Ill.

♦ ♦ ♦

Russell J. Dickson, for 3 years Chicago district manager, Leschen Wire Rope Division, H. K. Porter Co., St. Louis, has been appointed division general sales manager.

♦ ♦ ♦

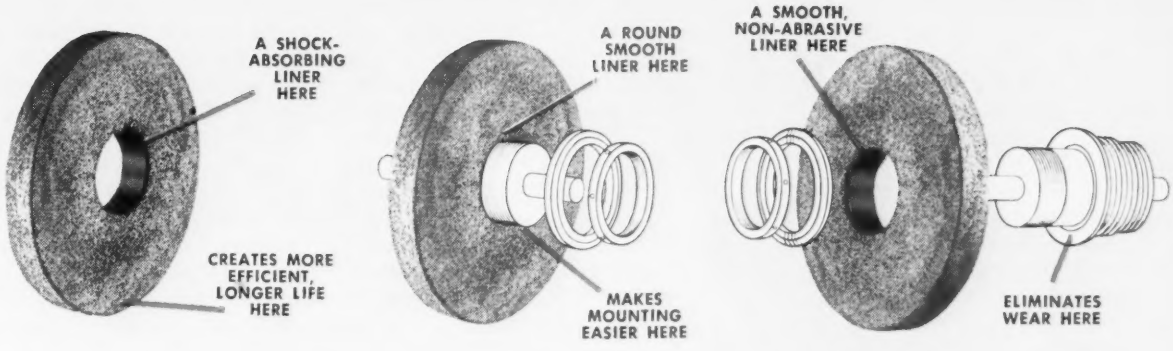
Dr. Mark E. Putnam, executive vice president, Dow Chemical Co., Midland, Mich., was recently named a director of Campbell, Wyant & Cannon Foundry Co., Muskegon.

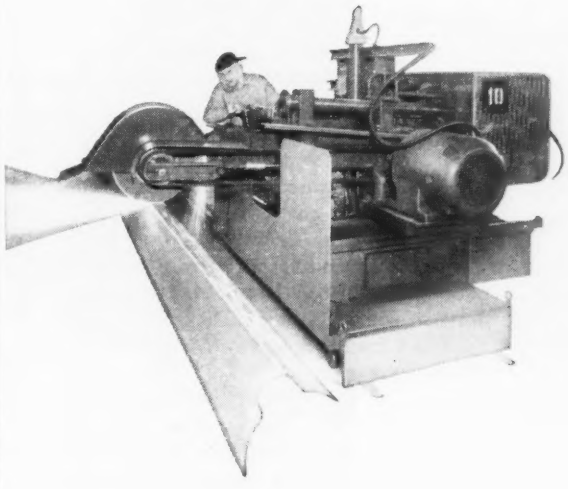
♦ ♦ ♦

George J. Ries, secretary and director of purchases, Advance Aluminum Castings Corp., Chicago, also has been named assistant factory manager. **Max E. Allen** will serve henceforth as purchasing agent.

For rugged conditioning jobs you can't beat...

MID-WEST FIBER-CUSHIONED SNAGGING WHEELS

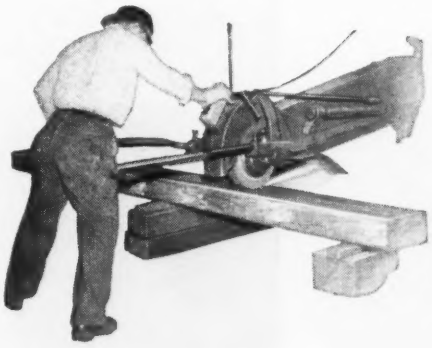

A SHOCK-ABSORBING LINER HERE
CREATES MORE EFFICIENT, LONGER LIFE HERE
A ROUND SMOOTH LINER HERE
MAKES MOUNTING EASIER HERE
A SMOOTH, NON-ABRASIVE LINER HERE
ELIMINATES WEAR HERE



Whether you use MID-WEST'S new automatic grinders, or hand-operated swing-frame grinders...

- **Mid-West snagging wheels are easier to mount!**
- **Their greater efficiency cuts grinding costs!**
- **And they're easier on your operator!**

Mid-West designed fiber-cushioned centers, plus Mid-West's special resinoid bond—an extremely tough, tenacious bond—assure increased production and lower grinding costs per ton! For complete information regarding fiber-cushioned snagging wheels—write, wire or phone today.



MID-WEST ABRASIVES

EXECUTIVE OFFICES: 510 SOUTH WASHINGTON ST., OWOSSO, MICH.
FACTORIES: OWOSSO, MICH. • ROCHESTER, PENNA.

GRAY IRON FOUNDERS' SOCIETY

Marks 25th Anniversary at Annual Meeting

WHILE the 25th anniversary of the founding of the organization was a feature of the program of the annual meeting of the Gray Iron Founders' Society, held at the Hotel Jefferson, St. Louis, Oct. 8-9, emphasis also was placed on the problems facing the industry and the present and future activities of the society.

Tribute to the society's founders and to those who have brought service and progress to the organization during the last 25 years, was paid by its president, Henry J. Trenkamp, Ohio Foundry Co., Cleveland, Donald H. Workman, executive vice president, and Peter E. Rentschler, Hamilton Foundry & Machine Co., Hamilton, O., the keynote speaker of the convention.

Mr. Rentschler outlined the activities that led up to the formation of the Gray Iron Institute, predecessor of the Gray Iron Founders' Society. Agitation for an organization reached its peak in 1928 when some leaders pointed out that gray iron was being replaced by other materials and that quality improvement and market development were being neglected. The need for foundrymen to co-operate for the good of the industry as a whole also was stressed.

Groundwork for the organization was laid at the Carnegie Institute of Technology on Mar. 13, 1928, when 54 foundrymen and others directly interested in the gray iron industry, representing 27 foundry centers in 14 states, met and considered the problem. Some of the purposes for the new organization were:

To improve the quality and increase the utility of gray iron; to study hand-to-mouth buying; to study the facilities in existence and determine if there was an over-capacity; to examine new methods of merchandising; to develop new markets; to study possible liquidation and consolidation of facilities, and to study use of advertising and other publicity media.

A second meeting was held in Cleveland on Apr. 10, 1928, and Walter L. Seelbach, Forest City-Walworth Run Foundries, Cleveland, was elected president; the late B. H. Johnson, Cresson-Morris Co., Philadelphia, was made first vice president; A. E. Hageboeck, Frank Foundries, Moline, Ill., second vice president; Henry Chafee, Builders Iron Foundry Co., Providence, R. I., treasurer, and the late Arthur J. Tuscany, executive secretary.

Cost work became one of the early activities of the institute and a standard cost system for gray iron foundries was published in 1930.

Mr. Rentschler traced the activities of the society during NRA days in the development of the code of fair competition for the gray iron industry. He paid tribute to the tremendous contributions of Col. William Watts Rose, who became executive vice president in 1936 after NRA's demise, and indicated that it was his efforts and the additional contributions of some of the members of the society that kept the organization going. It was pointed out that the society rendered great service in World War II and that the membership reached a total of over 600 during that period. In conclusion, he said that the gray iron industry has a truly great representative in the society and has the potential for achieving greater heights. However, the extent to which this is realized depends upon the work of the individual members.

President Trenkamp stated that the society and its committees have just completed an active and important year. He paid tribute to those who served the several government agencies during the Korean emergency and also to the society committees and subcommittees that worked throughout the war in the interests of the government and the industry. Telegrams of congratulations were received from Arthur J. Tuscany Jr., Mrs. William Watts Rose, the Foundry Equipment Manufacturers' Association, and a cablegram was received from Walter L. Seelbach, who had been attending the International Foundry Congress in Paris.

Donald H. Workman reviewed many of the activities of the society. He pointed to a departure this year in presentation of committee reports. Instead of having each committee chairman give a report to the meeting, these were published and distributed to those in attendance. Mr. Workman referred to several of these reports, including the work of the Statistical Committee, the Terms and Conditions of Sale Committee and the Advertising Publicity and Sales Promotion Committee.

Charles O. Burgess, technical director, stated that the two major activities of the technical department during the year were: A trip to Europe to observe the service to members and research work of the British Cast Iron Research Association; and completion of the chapter on heat treating of gray iron for a forthcoming manual.

He said that the British Cast Iron Research Association and the Gray Iron Founders' Society have arranged to exchange advance information on developments in the two countries which are of interest and value to the members of each organization. He also indicated that a program of

(Continued on page 146)

Luncheon session at the annual meeting of the Gray Iron Founders' Society in St. Louis

Crossed Up by core room problems?

SMITH L-O
HELPS SOLVE 'EM!

Put Smith L-O Core Oil on the job and you'll notice an appreciable gain in savings of time, effort — and *clean, accurate* cores. It has been the solution to core room problems for many a foundry.

Important, too, is the Smith representative who calls on you. More than an order taker, he is qualified — and anxious — to study your set-up so as to recommend the grade of Smith L-O Core Oil that best fits your particular production facilities and casting requirements.

Take advantage of Smith L-O's uniform high quality . . . take advantage too of the Smith sales force. You'll find both are capable of giving you the results you want.

SMITH REPRESENTATIVES

- COLUMBIAN WAREHOUSE CO. Reading, Pennsylvania
- ELTEX CHEMICAL COMPANY Houston 2, Texas
- FOUNDRIES MATERIALS CO. Coldwater, Michigan
- FOUNDRY SERVICE CO. Birmingham, Alabama
- F. F. SHORTSLEEVE Elmira, New York
- MALCOLM G. STEVENS Arlington, Massachusetts
- PACIFIC GRAPHITE CO., INC. Los Angeles 22, California
- ST. LOUIS COKE & FOUNDRY SUPPLY CO. St. Louis, Missouri
- WESTERN FOUNDRY SAND CO. Seattle, Washington
- WESTERN INDUSTRIAL SUPPLY CO. Portland 14, Oregon
- THOMAS H. GREGG CO. Milwaukee 9, Wisconsin

Smith L-O Core Oil

ROD DIP LIQUID PARTING

SMITH OIL & REFINING CO.

MANUFACTURERS OF L-O AND CERTIFIED CORE OILS
INDUSTRIAL OILS DIVISION • ROCKFORD, ILLINOIS

(*Continued from page* 144)

research had been prepared and submitted to the board of directors.

Mr. Burgess believes that the manual on heat treating to be published before the end of the year, will be outstanding in that it will present for the first time all of the phases of heat treatment of gray iron. Two sections dealing with "Stress Relief of Gray Iron" appeared in the August and September issues of FOUNDRY, and two more, dealing with "Annealing or Softening" will appear in subsequent issues. Mr. Burgess also reported on several articles that the technical department prepared during the year, the various talks made and some of the studies conducted, including one on shell molding.

William N. Davis, American Foundrymen's Society, reported on the safety, hygiene and air pollution program of the AFS. He indicated that this program was organized at the request of the National Castings Council and has had the support of all phases of the industry. He mentioned the committee activities and pointed to the possible need for additional funds in the future to continue the work.

Walter Williams, undersecretary, Department of Commerce, Washington, announced that the gray iron industry would be represented in the new Business and Defense Services Administration being set up by Secretary of Commerce Weeks in the Department of Commerce, and that gray iron would not again be overlooked in any future emergency. The representation that gray iron will have in the Iron and Steel Division of the BDSA will bring the industry in the picture at the time defense and mobilization plans are being made and will permit the industry to make its capabilities and special problems known so that any future program will have the benefit of the industry's potential contribution from the very start of the mobilization effort.

Walter Williams, Under Secretary of Commerce, Addressing the Gray Iron Founders' Society meeting

Secretary Williams devoted considerable time discussing progress made by the administration in reducing an apparent deficit in the national budget. He indicated that the President has developed in his command the mechanism to permit considered and prompt action when economic readjustments threaten to get out of hand and became emergencies. This mechanism consists of two parts:

1. A council of economic advisors which keeps factual tab on the trends of the economy and which reports developments suggesting need for government action. 2. An eight-man advisory board of economic growth and stability. Fiscal, credit and monetary and debt management measures also can be used to exercise a major influence on the economy. Finally, measures dealing with an overhaul of our tax structure in such a manner as to encourage investment and consumption can be utilized.

The afternoon session was devoted to a panel on management techniques, with S. C. Massari, manager, Foundry Division, Hansell-Elcock Co., Chicago, as chairman. Mr. Massari pointed out that management must control costs, improve manufacturing operations, and understand new methods if it is to maintain its competitive position.

Speaking on "Costing as a Management Tool of Control," C. R. Culling, president, Carondelet Foundry Co., St. Louis, stated that if a cost system is used only as a measure of past performance, costwise, and as a basis of future selling prices, it is not being utilized to the fullest extent. If a cost system fits the particular needs properly, the foundryman has available current information being collected daily and weekly which should be used as tools of control currently.

Reviews Cost System

Mr. Culling then outlined the uses that could be made of various cost factors now being collected. Direct costs in molding, coremaking, cleaning and melting can be used to gage the balance of costs and to aid in establishing standards. With this information prepared each week, the plan has a measurement of over-all efficiency as well as departmental efficiency. With a little additional work, it is possible to prepare a scrap analysis, showing how the losses run in each molding center.

Mr. Culling stressed the point that too many plants fail to gather full departmental costs monthly instead of quarterly, and thus lose the opportunity to make necessary adjustments immediately. In conclusion, he suggested that each plant review its cost system to see if maximum benefits are being derived.

James H. Smith, general manager, Central Foundry Division, General Motors Corp., Saginaw, Mich., discussed "Methods Engineering as a Tool for Management," and then presented the interesting motion picture which originally was prepared for the Charles Edgar Hoyt lecture of the AFS (FOUNDRY, August 1953, p. 100). The film deals with the production of shell mold castings, and the results of better method studies made by the plant.

(*Continued on page* 149)

Henry J. Trenkamp, president, awards the society's highest honor, the gold medal, to Frank G. Steinebach, editor, *Foundry*, at the closing luncheon

Why does the SPEEDMULLOR Use Less Power?

A 125 horsepower motor (in the 80A Speedmullor) operated for one minute, consumes far fewer *K.W.H.* than a 75 horsepower motor operated for three or more minutes. Because the Speedmullor thoroughly mulls molding and core sands to *maximum physical properties in less than one-third the time* required in a conventional mixer, it uses fewer K.W.H. of electrical power per ton of sand. Electric bills are based on K.W.H. . . . you pay for K.W.H. and not horsepower. Your costs are determined by K.W.H. per ton of sand mulled.

Modern high speed mulling pays off in capacity too. The 80A Speedmullor *fully mulls* more sand per hour than any other mill.

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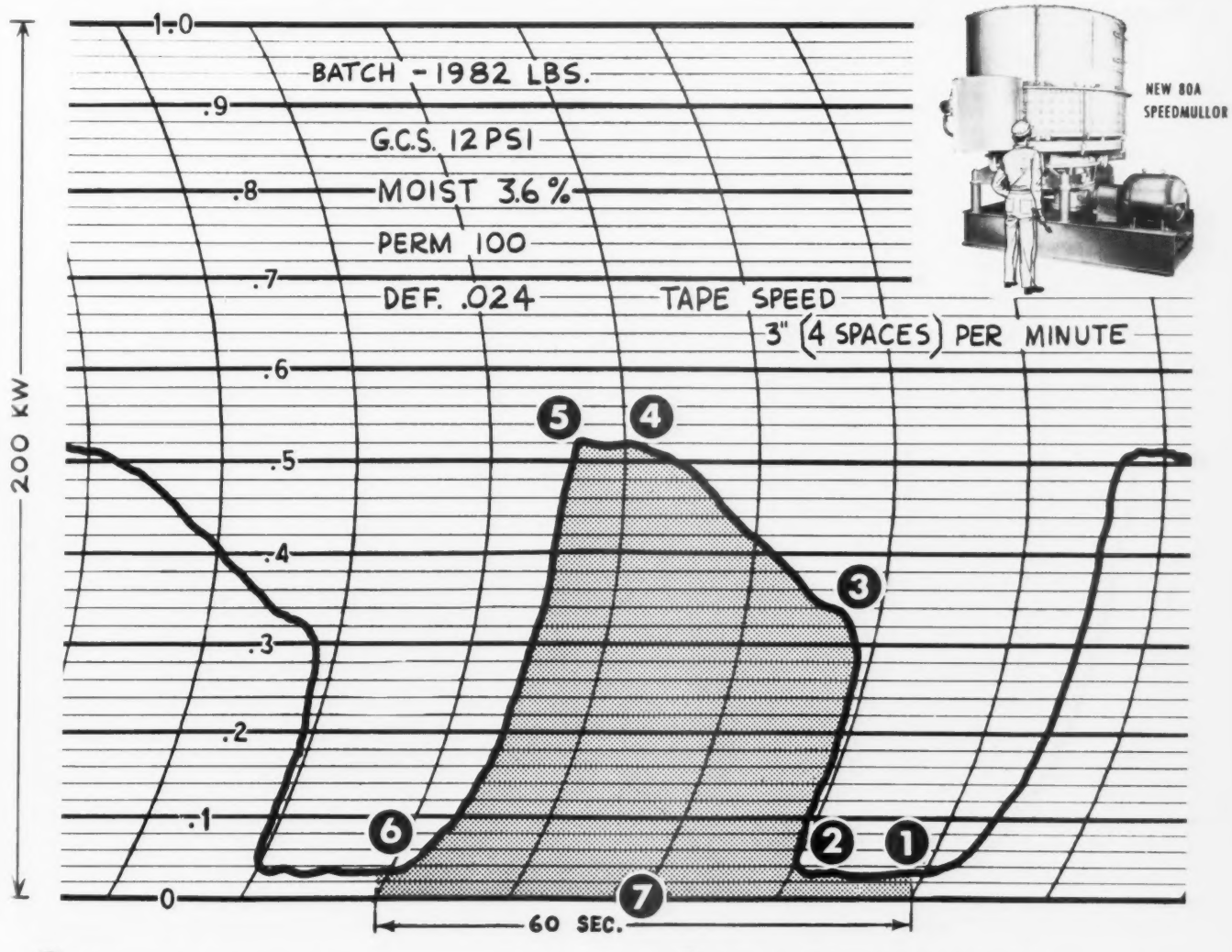
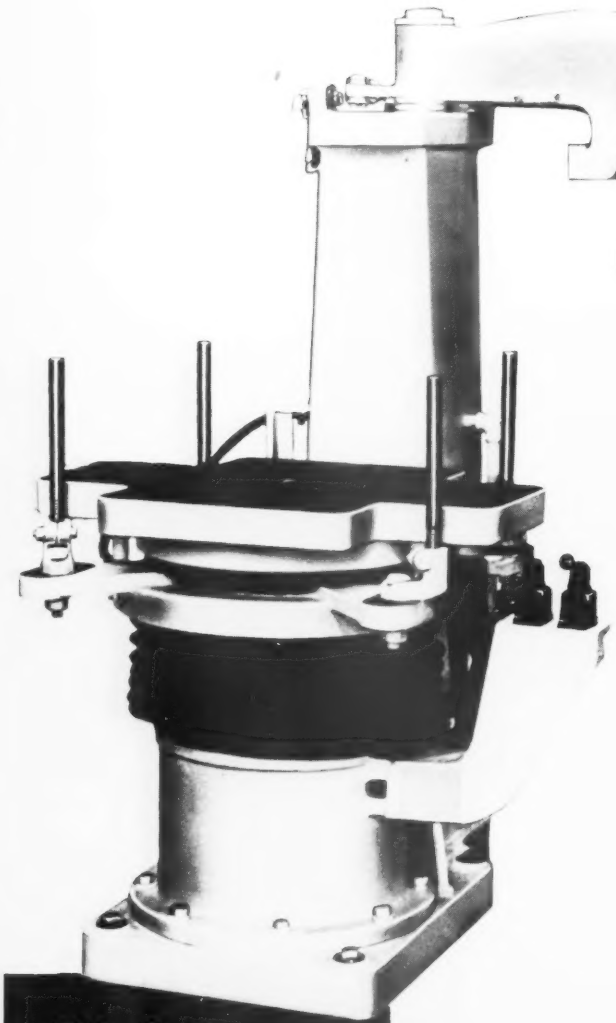
AN ACTUAL POWER GRAPH RECORD OF A 1982 LB. BATCH OF MOLDING SAND MULLED IN AN 80A SPEEDMULLOR.



1. Flush water is introduced.
2. Batch of sand and bonding additions charged.
3. "Temper water is added and strength starts developing.
4. The maximum physical properties are attained after 45 seconds . . . green compressive strength—12 p.s.i.
5. Batch is discharged after 51 seconds.
6. Discharge complete in 9 seconds (⅓ to ½ the time required by conventional muller).
7. Total elapsed cycle time—60 seconds . . . average horsepower for cycle—81.66 . . . total power consumed—1.02 K.W.H. to fully mull 1982 lb. batch.

The Only Completely NEW
JOLT SQUEEZE PIN-LIFT Machines



716-8
7" jolt cylinder
16" squeeze cylinder
8" pattern draw
24" x 34" table

513-6
5" jolt cylinder
13" squeeze cylinder
6" pattern draw
19" x 26" table

Brand new in design and featuring an exclusive concentric draw cylinder guided by a full-circle bearing area around the large squeeze cylinder, the J&J 513-6 and 716-8 offer the most accurate draw obtainable with this type of machine.

Internal guides are hardened and ground to assure retained accuracy of draw. The jolt of the 513-6 is knee-valve-controlled, while a single hand-valve controls both squeeze and draw. Two convenient pilot valves control all operations on the 716-8. Both machines feature positive, controlled slow and fast draw on the same stroke, with automatic vibrator control.

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(*Continued from page* 146)

The methods engineering program is a part of the better methods department at Saginaw and was organized many years ago. In 1930, the company felt the program could be accelerated by motion study, and since that time, practically all engineers and supervisors at Saginaw have been trained so that they have a greater appreciation of the problems of job improvement and are more receptive to changes as they are made. While the company has done a tremendous amount of work, Mr. Smith emphasized that the methods engineering program necessarily is a continuing activity because each day's improvement may become obsolete tomorrow through new ideas and technological betterments.

The third speaker, Tom W. Curry, director of manufacturing research, Lynchburg Foundry Co., Lynchburg, Va., spoke on "Should You Adopt Shell Molding?" Mr. Curry said there may have been some misunderstanding as to the dimensional tolerances achieved through shell molding. His organization has found that one cannot quote a tolerance of 0.002 to 0.003-in. per inch and expect it to apply to all shell-mold castings. Each casting requires a separate study in order to intelligently predict the dimensions to be obtained.

His company's experience has shown that if all critical dimensions are on one side of the shell, drawing dimensions are obtained within a tolerance of ±0.002-in. per inch. If the critical dimensions are across the joint of a shell mold, or if a core, which is made separately, is set in the mold, the dimensions will be a minimum of 0.030 in. in excess of the pattern dimension. Some operators have reported an excess of as much as 0.060-in.

If it is necessary to attach a gate to a surface involved in a critical dimension, an allowance of a minimum of 0.020 to 0.030-in. should be made. Out of roundness has been encountered in some castings when the critical dimensions are all on one side of the mold. This is particularly troublesome when the castings are poured in the vertical position. Some difficulty has been found in producing a straight, flat surface—the result of shell warpage in mold assembly. Certain types of castings, such as a wheel with a long, relatively heavy hub, which are poured in the vertical position, require a careful back-up to prevent swells on the underside of the hub.

Mr. Curry said that the good surface finish of shell-mold castings is necessary because it plays a vital part in obtaining close dimensional tolerances. Also, smooth surface has a great sales appeal; some large, potential consumers term it the No. 1 advantage of the process. Mr. Curry emphasized that both go hand in hand; the combination of finish and consistent dimension is much more valuable than finish alone in processing the castings.

In conclusion, Mr. Curry stated that the Lynchburg Foundry Co. sees great possibilities in shell molding and is building a shell molding foundry with a capacity of approximately 100 tons of castings a day.

"Work Simplification in the Foundry" by W. S. Williams, work simplification director, Lynchburg Foundry Co., Lynchburg, Va., was the subject of an interesting discussion at the final business session. Work simplification is defined as the organized application of common sense to eliminate all waste of time, effort, material or space. However, it is not enough to develop a better method. The job is not over until acceptance of that method has been developed as well.

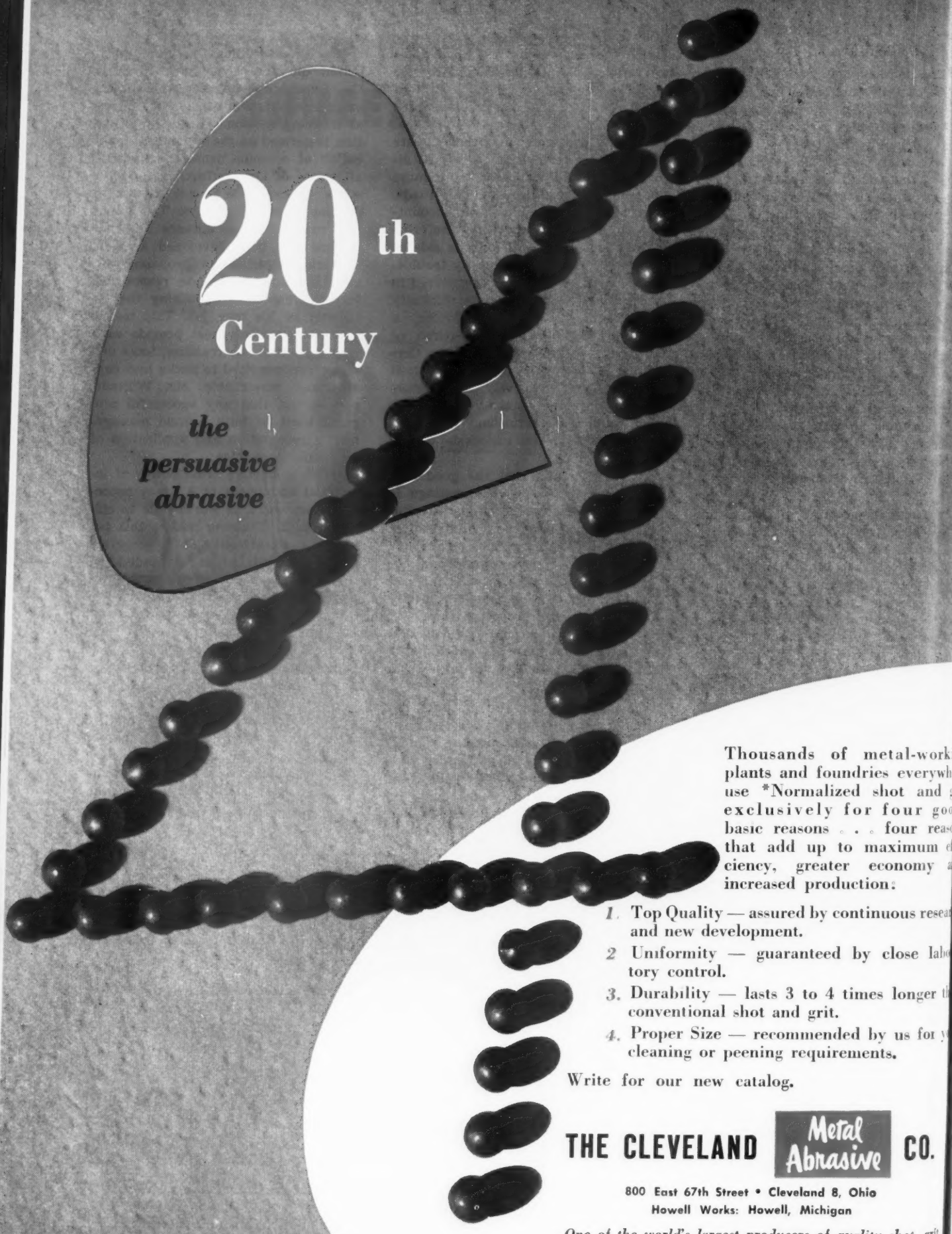
Work simplification proposes that each employee be made responsible for, and capable of, policing the efficiency of his own job. This means that management must provide each employee with the training, tools and techniques required to make him capable and responsible. Mr. Williams pointed out that any successful program must be built around management's recognition and application of four basic principles:

1. The collective brain power of individual employees is a great potential asset and it is worthwhile to cultivate it. 2. Training makes this potential asset effective. 3. Appropriate incentives will induce the individual to utilize this training. 4. Channels of communication must be established to assure that employee ideas are evaluated impartially and correctly and utilized where sound.

Mr. Williams, in describing the work simplification training sessions at the Lynchburg company, said that every year the company is adopting ideas which average approximately $20,000 net annual savings. It is estimated that the benefits since the program was started six years ago

(*Please turn to page* 220)

GIFS officers and directors. Seated, left to right, C. H. Meminger, Posey Iron Works, Lancaster, Pa.; R. T. Lewis, Keen Foundry Co., Griffith, Ind.; C. H. Ker, Dalton Foundries Inc., Warsaw, Ind., vice president; Henry J. Trenkamp, Ohio Foundry Co., Cleveland, president; Walter O. Larson, W. O. Larson Foundry Co., Grafton, O., treasurer; H. L. Edinger, Barnett Foundry & Machine Co., Irvington, N. J. Standing: J. W. Simmons Jr., Cox Foundry & Machine Co., Atlanta; G. L. Nimocks, Dayton Foundry, Hollydale, Calif.; Donald H. Workman, executive vice president; J. A. Cochran, Crawfordsville Foundry Co., Crawfordsville, Ind.; E. M. Knapp, Ferro Machine & Foundry Inc., Cleveland; Summerfield Brunk, Headford Bros. & Hitchins Foundry Co., Waterloo, Iowa; E. L. Roth, Motor Castings Co., Milwaukee



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*Copyrighted trade name

Foundry Statistics

Malleable Iron

(Shipments of castings—net tons[1])

	Shipments—Total	Shipments—For Sale	Unfilled Orders[2]
1951	1,085,241	656,076	.....
1952			
July	45,266	29,675	166,517
7 mo.	541,613	338,200	.....
Aug.	63,716	39,308	162,832
Sept.	75,950	45,849	168,367
Oct.	88,062	52,922	168,609
Nov.	76,099	46,708	167,842
Dec.	80,680	50,485	173,494
Total	926,120	573,472	.....
1953			
Jan.	87,249	53,272	174,809
Feb.	86,515	51,963	175,088
Mar.	94,481	57,025	177,776
Apr.	95,923	57,757	174,514
May	82,050	48,011	160,387
June	86,514	50,819	151,016
July	77,111	45,413	137,251
7 mo.	609,843	364,260	.....

Aluminum

(Shipments of castings—1000 pounds[1])

	Shipments—Total	Sand	Perm. Mold	Die	Unfilled Orders[2]
1951	515,131	193,378	160,011	151,465	.....
1952[3]					
July	35,275	14,014	9,232	11,302	111,518
7 mo.	282,895	111,527	79,030	86,851	.....
Aug.	39,197	15,834	10,493	11,730	117,648
Sept.	45,430	16,733	12,515	15,888	127,777
Oct.	51,631	17,826	15,191	18,284	132,624
Nov.	46,483	15,419	13,463	17,372	138,461
Dec.	53,343	17,277	16,191	19,608	146,499
Total	518,979	194,616	146,883	169,732	.....
1953[3]					
Jan.	55,629	19,158	16,147	20,052	142,542
Feb.	54,864	17,583	16,698	20,272	148,557
Mar.	59,423	18,989	17,865	22,255	145,749
Apr.	61,582	20,009	18,583	22,620	141,231
May	57,602	19,600	16,479	21,208	138,037
June	56,820	19,330	15,535	21,675	136,437
July	51,653	16,664	15,733	18,915	126,426
7 mo.	397,573	131,333	117,040	146,997	.....

Copper-Base Alloy

(Shipments of castings—1000 pounds[1])

	Shipments—Total	Sand	Perm. Mold	Unfilled Orders[2]
1951	1,197,443	1,075,437	69,883	.....
1952[3]				
July	66,177	60,249	3,669	89,662
7 mo.	580,957	522,709	37,787	.....
Aug.	78,798	71,273	5,154	89,310
Sept.	85,815	78,278	4,680	89,034
Oct.	93,102	84,544	5,518	86,779
Nov.	80,439	72,281	5,011	82,393
Dec.	90,799	81,777	5,715	76,871
Total	1,009,910	910,862	63,865	.....
1953[3]				
Jan.	85,781	76,686	5,388	80,793
Feb.	85,183	76,847	5,061	76,578
Mar.	92,798	83,639	5,716	69,490
Apr.	94,362	85,471	5,462	72,291
May	85,223	76,912	4,855	66,926
June	84,656	76,333	4,706	64,535
July	71,041	64,451	3,926	61,209
7 mo.	599,044	540,339	35,114	.....

Magnesium

(Shipments of castings—1000 pounds[1])

	Shipments—Total	For Sale	Unfilled Orders[2]
1951	30,825	28,090	.....
1952[3]			
July	2,405	2,303	14,052
7 mo.	19,970	18,911	.....
Aug.	2,478	2,390	14,288
Sept.	3,090	2,949	16,833
Oct.	3,250	3,070	16,237
Nov.	2,959	2,785	17,053
Dec.	3,110	2,872	16,020
Total	34,857	32,977	.....
1953[3]			
Jan.	3,073	2,825	15,680
Feb.	3,225	3,033	14,834
Mar.	3,362	3,093	13,608
Apr.	3,294	3,046	12,709
May	2,679	2,434	13,635
June	3,136	2,666	13,664
July	2,256	1,968	13,483
7 mo.	21,025	19,065	.....

Foundry Production Workers

Estimated Number

(Thousands)

	June 1953	May 1953	June 1952
Ferrous	221.2	222.4	221.1
Nonferrous	80.0	79.2	73.2

Average Weekly Earnings

Gray Iron	$76.54	$75.81	$68.20
Malleable Iron	78.91	79.42	72.10
Steel	81.36	79.18	79.24
Nonferrous	80.18	80.56	75.58

Average Weekly Hours

Gray Iron	41.6	41.2	39.7
Malleable Iron	41.1	41.8	39.9
Steel	41.3	40.4	43.3
Nonferrous	40.7	41.1	41.1

Labor Turnover Rate (June)

(Per 100 employees)

	Total Accession	Total Separation	Quit	Layoff
Gray Iron	3.6	4.7	2.3	1.7
Malleable Iron	5.7	4.8	3.5	0.5
Steel	3.6	3.8	2.1	0.9
Nonferrous	5.2	4.1	2.5	0.6

Source: Bureau of Labor Statistics

Gray Iron Castings—Shipments

(Net tons[1])

	All Castings—Total	All Castings—For Sale	Miscellaneous Castings—Total	Miscellaneous Castings—For Sale	Heavy Steel Ingot Molds—Total	Heavy Steel Ingot Molds—For Sale	Chilled Railroad Car Wheels—Total	Pressure Pipe & Fittings—Total[4]	Soil Pipe & Fittings—Total[4]	Unfilled Orders[2]
1951	14,988,555	8,453,048	9,573,347	4,471,539	2,614,517	1,257,542	639,996	1,473,192	687,503	.....
1952										
July	636,423	431,889	407,757	227,794	14,794	10,223	40,783	96,784	56,305	1,409,684
7 mo.	7,303,562	4,238,281	4,698,362	2,228,094	1,099,818	524,805	339,102	784,875	355,886	.....
Aug.	1,001,629	602,025	596,369	295,861	198,856	99,760	35,606	108,313	62,485	1,513,166
Sept.	1,119,373	629,708	676,732	309,299	230,219	107,987	39,912	107,847	64,663	1,450,723
Oct.	1,233,480	688,837	759,131	340,695	243,462	117,255	45,664	117,089	68,134	1,391,609
Nov.	1,060,735	593,779	649,316	296,674	218,349	104,035	41,655	99,196	52,219	1,309,252
Dec.	1,141,658	619,070	713,332	321,939	247,605	116,410	42,957	95,198	42,566	1,316,308
Total	12,860,437	7,371,700	8,113,242	3,792,562	2,238,309	1,070,252	544,896	1,312,518	651,472	.....
1953										
Jan.	1,161,945	622,392	730,216	324,330	252,181	118,514	38,385	93,930	47,233	1,333,255
Feb.	1,135,868	607,160	721,847	315,101	228,360	106,398	44,420	93,152	48,089	1,332,038
Mar.	1,264,271	674,720	800,390	341,656	250,447	119,630	41,414	114,885	57,135	1,375,886
Apr.	1,277,288	683,047	799,872	329,802	246,873	122,702	44,877	120,105	65,561	1,305,849
May	1,185,545	641,581	734,326	312,836	238,202	115,728	41,373	113,136	58,508	1,271,711
June	1,196,106	648,400	743,737	312,681	232,596	115,946	45,542	114,118	60,113	1,245,904
July	1,056,422	573,280	752,371	274,890	212,187	106,526	36,715	97,739	57,410	1,232,651
7 mo.	8,277,445	4,450,580	5,282,759	2,121,296	1,660,846	805,444	292,726	747,065	394,049	.....

Steel Castings—Shipments

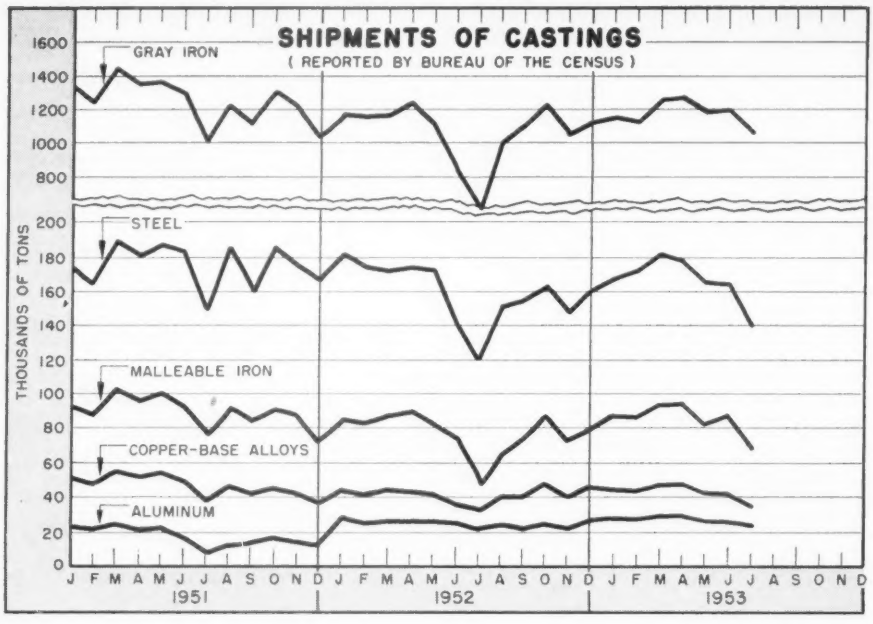
(Net tons[1])

	All Castings—Total	All Castings—For Sale	All Castings—Railway Specialties	Carbon Steel—Total	Carbon Steel—For Sale	Carbon Steel—Railway Specialties	Alloy Steel—Total	Alloy Steel—For Sale	Alloy Steel—Railway Specialties	Unfilled Orders[2]
1951	2,050,054	1,506,903	466,172	1,541,280	1,162,687	415,915	508,574	344,216	50,157	.....
1952										
July	119,036	97,633	20,752	81,576	67,600	18,694	37,460	30,329	2,058	855,046
7 mo.	1,141,432	883,584	220,911	822,609	637,988	194,141	320,813	248,573	26,770	.....
Aug.	150,232	113,997	24,498	107,203	81,123	21,626	43,029	33,359	2,872	809,354
Sept.	158,392	121,402	20,686	109,011	82,968	17,843	49,381	39,190	2,843	781,929
Oct.	165,155	124,626	23,590	116,201	87,035	20,611	48,954	38,571	2,979	772,949
Nov.	148,259	110,467	23,148	105,314	77,979	20,681	42,945	33,349	2,467	751,687
Dec.	161,733	122,166	26,728	114,146	86,165	24,046	47,587	36,757	2,682	719,203
Total	1,925,203	1,476,242	339,561	1,372,494	1,053,264	298,948	552,709	430,429	40,613	.....
1953										
Jan.	167,211	126,819	27,150	118,423	118,423	24,788	48,788	38,121	2,362	706,490
Feb.	175,675	137,592	33,156	122,624	94,991	29,828	53,051	43,495	3,328	644,302
Mar.	182,181	141,873	34,364	129,055	100,069	31,772	53,126	42,286	2,592	634,600
Apr.	179,615	140,051	34,035	128,457	99,602	31,212	51,158	40,938	2,823	573,565
May	165,649	126,380	29,552	117,318	88,781	26,888	48,331	38,036	2,664	196,047
June	164,665	125,984	30,381	116,358	88,260	27,767	48,307	38,130	2,614	475,756
July	139,577	105,687	22,925	95,891	71,488	20,938	43,686	34,532	1,987	467,900
7 mo.	1,174,573	904,386	211,563	828,126	661,614	193,193	346,447	275,538	18,370	.....

[1] Source: Bureau of Census. [2] For sale only. [3] Based on new sampling method; not comparable to prior figures.
[4] All cast iron pipe is shipped for sale.

(Concluded on page 152)

FOUNDRY STATISTICS (Concluded from page 151)



Index of Foundry Equipment Orders

Foundry.Trades.Only
(Net Orders Closed, New Equipment)

	1952	1953
Jan.	404.5	301.0
Feb.	200.4	257.3
Mar.	310.0	396.7
Apr.	385.1	303.0
May	225.2	294.4
June	353.8	446.8
July	343.9	440.8
Aug.	311.6	633.3
Sept.	365.9	....
Oct.	335.8	....
Nov.	258.1	....
Dec.	343.3	....

Note: Figures are percentages of the base period 1937-1939 taken as 100 per cent (monthly average). Source: Foundry Equipment Manufacturers Association.

Coke Production and Consumption

(Net tons)

	Production	Consumption Total	Consumption By Foundries
1951	79,133,744	78,868,124	3,664,404
1952			
Aug.	6,039,749	6,204,539	232,249
8 mo.	42,606,808	40,835,295	1,897,510
Sept.	6,180,804	6,517,682	269,029
Oct.	6,449,519	6,792,273	276,427
Nov.	6,316,660	6,418,639	252,805
Dec	6,690,649	6,981,036	246,107
Total	68,244,440	67,876,964	2,955,241
1953			
Jan.	6,767,814	6,884,585	248,557
Feb.	6,132,084	6,263,083	237,670
Mar.	6,835,310	6,875,568	275,442
Apr.	6,538,477	6,536,195	272,229
May	6,820,985	6,748,957	274,236
June	6,613,614	6,683,768	254,830
July	6,750,381	6,656,222	218,470
Aug.	6,763,491	6,605,603	237,523
8 mo.	53,222,156	53,253,981	2,018,957

Ingot Brass & Bronze

(Shipments in net tons)

	1952	1953
Jan.	28,315	24,423
Feb.	24,211	25,429
Mar.	23,890	28,256
Apr.	22,547	25,044
May	21,740	21,660
June	21,274	20,818
July	18,947	19,321
Aug.	21,807	20,156
Sept.	22,770	.....
Oct.	25,811	.....
Nov.	23,441	.....
Dec.	22,983	.....
Total for year	277,736	.....

Zinc-Base Alloy

(Shipments of castings—1000 pounds[1])

	Shipments—Totals	Shipments—For Sale	Unfilled Orders[2]
1951	478,996	324,964	.....
1952[3]			
July	21,953	15,920	93,676
7 mo.	223,847	154,349	.....
12 mo.	408,353	282,673	.....
1953[3]			
Feb.	46,583	31,761	91,800
Mar.	51,673	35,460	90,266
Apr.	51,456	34,674	91,874
May	44,471	29,403	85,234
June	49,051	31,255	88,060
July	39,476	25,337	83,391
7 mo.	328,651	218,592	.....

Pig Iron Production and Consumption

	Production** (Standard grades—1000 net tons) Total	Foundry	Malleable	Basic	Low Phos. Intermediate Low Phos. & Bessemer	Consumption* (By type of furnace, 1000 gross tons) Total	Cupola	Air	Electric
1951	70,264.5	3,186.2	3,169.0	55,134.1	8,774.8	63,760	5,731	354	136
1952									
Aug.	5,767.3	262.9	280.6	4,553.8	669.9	5,063	423	9	8
8 mo.	.....	.....	.....	.....	.....	.....	.....	.....	.....
Sept.	6,069.3	294.7	306.6	4,757.0	710.9	5,363	417	21	9
Oct.	6,415.3	280.0	299.4	5,091.6	744.2	5,812	463	24	9
Nov.	6,138.9	262.0	315.4	4,842.6	718.8	5,472	397	21	12
Dec.	6,414.7	293.4	315.1	5,106.9	699.2	5,685	419	24	14
Total	61,306.8	2,864.2	3,013.3	48,254.0	7,174.9	54,911	4,909	269	113
1953									
Jan.	6,470.6	274.9	285.5	5,201.5	708.8	5,784	425	24	12
Feb.	5,802.6	187.0	294.6	3,640.7	680.3	5,027	418	24	14
Mar.	6,601.1	263.9	358.1	5,256.1	723.0	5,873	466	27	14
Apr.	6,161.6	244.7	327.1	4,885.6	704.2	5,568	478	28	12
May	6,508.5	210.0	347.7	5,237.0	713.8	5,844	436	24	14
June	6,288.0	201.6	313.4	5,075.0	698.0	5,581	437	24	12
July	6,425.9	213.5	344.4	5,145.1	722.9	....	....	....	....
Aug.	6,381.1	202.1	310.7	5,167.1	701.2	....	....	....	....
8 mo.	50,639.4	1,797.7	2,581.5	40,608.1	5,652.2	....	....	....	....

Iron and Steel Scrap Consumption

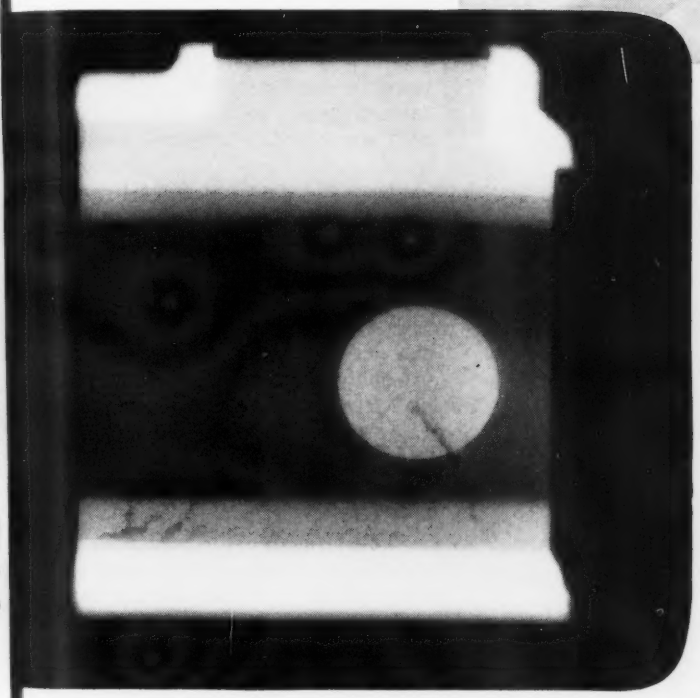
(Gross tons*)

	All Scrap—Total	All Scrap—Purchased	By Types of Furnace: Cupola—Total	Cupola—Purchased	Air—Total	Air—Purchased	Electric—Total	Electric—Purchased
1951	68,518,208	33,822,431	11,090,607	5,878,939	1,203,740	441,099	8,391,919	5,389,005
1952								
June	2,048,951	1,169,102	719,739	374,127	82,357	30,412	285,596	173,740
6 mo.	30,100,672	14,838,381	4,760,590	2,514,128	571,875	213,965	3,852,876	2,442,151
July	1,965,007	1,156,296	524,651	278,750	52,999	19,733	364,536	244,944
Aug.	5,470,696	2,738,593	721,255	348,181	74,351	28,091	682,405	446,543
Sept.	5,782,986	2,862,994	760,092	389,910	82,212	30,493	761,795	501,602
Oct.	6,256,031	3,066,041	851,458	439,401	98,947	37,743	814,565	546,189
Nov.	5,960,435	2,885,008	731,825	379,950	80,228	30,502	780,042	518,320
Dec.	6,089,722	2,973,633	804,275	412,177	92,621	35,064	758,845	491,084
Total	61,625,549	30,520,946	9,154,146	4,752,497	1,053,233	395,591	8,015,064	5,190,833
1953								
Jan.	6,256,718	3,061,551	810,254	413,971	95,430	35,695	795,292	517,963
Feb.	5,802,854	2,817,896	818,375	422,306	92,371	35,234	745,179	478,488
Mar.	6,536,867	3,211,476	901,786	464,110	103,034	38,583	857,760	563,489
Apr.	6,227,089	3,026,533	921,589	474,185	106,449	41,004	820,647	531,508
May	6,294,920	3,105,598	861,404	450,477	92,703	35,566	798,098	523,606
June	5,951,170	2,835,875	876,320	454,905	99,799	38,934	743,530	468,129
6 mo.	37,069,618	18,058,929	5,189,728	2,679,954	589,786	235,016	4,760,506	3,083,182

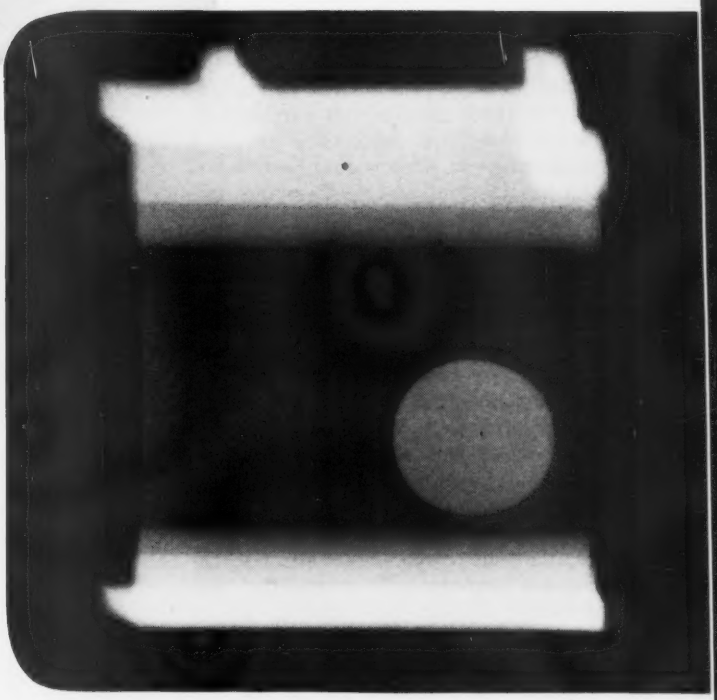
*Source: U. S. Dept. of Interior. Bureau of Mines. **Source: American Iron & Steel Institute. [1]Source: Bureau of the Census. [2]For sale only. [3]Based on new sampling method; not comparable to prior figures.

When shrink occurs...

Yield shrinks, too...



Radiograph shows recurring defects due to shrinkage.



A change in gating produced sound castings.

Radiography helps avoid shrink

Shrink can pose a real problem in casting 355 aluminum. It did with this instrument housing.

But radiographs of the pilot runs showed a recurring pattern of defects. This suggested a change in gating which quickly corrected the difficulty.

This is a typical reason why more and more foundries are making full use of radiography. It proves the soundness of their work—helps build a reputation for prompt delivery of good castings.

If you'd like details on how Radiography can improve your operations, get in touch with your x-ray dealer. Or, write us for a free copy of "Radiography as a Foundry Tool."

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NATIONAL FOUNDRY ASSOCIATION

Meets To Discuss Management Problems

By WILLIAM G. GUDE
Managing Editor

AN INTERESTING program of discussions relating to problems of vital concern to foundry management was presented at the 55th annual meeting of the National Foundry Association, held at the Plaza Hotel, New York, Sept. 17-18. Topics treated included economic conditions, labor relations, marketing research, supervisory training and plant safety.

W. Summerfield Brunk, association president and president, Headford Bros. & Hitchins Foundry Co., Waterloo, Iowa, presided at the opening session and discussed some of the activities of the NFA since its formation in 1898. He referred particularly to the individual assistance provided companies on their labor problems, the association's extensive wage survey, its weekly news letter, and contacts made with governmental agencies.

Speaking on "Communications and Supervisory Training," Dr. E. M. Gherman, Chicago management consultant, stressed the importance of making sure that the intended meaning of directions and instructions is grasped by the individual for whom the messages are intended. The trouble is, he said, that there are 14,000 different meanings for the 500 commonest words. Consequently, incorrect inferences frequently are drawn, details are lost and the wrong message reaches the man on the job. This applies both to oral and written instructions; many people cannot write clearly, the speaker added.

To illustrate his point, Dr. Gherman showed briefly a slide of a picture containing considerable detail and asked a member of the audience to describe as much of the picture as he could remember to one of five other members who were out of the room when the slide was shown. The first listener then passed on what he was told to another of his group, and this procedure was repeated until the last received the description fifth-handed. Practically all of the original details were lost in the transmission and some of those remaining were incorrect.

W. SUMMERFIELD BRUNK
. . . re-elected NFA president

A moderately optimistic picture of economic conditions and business prospects was drawn in a talk by Martin R. Gainsbrugh, chief economist, National Industrial Conference Board. The economy has thus far taken in stride the initial economic problems arising from the post-Korean adjustment, he said. So far there is little evidence that these adjustments will be cumulative and foreshadow a major downturn in business activity in the months immediately ahead.

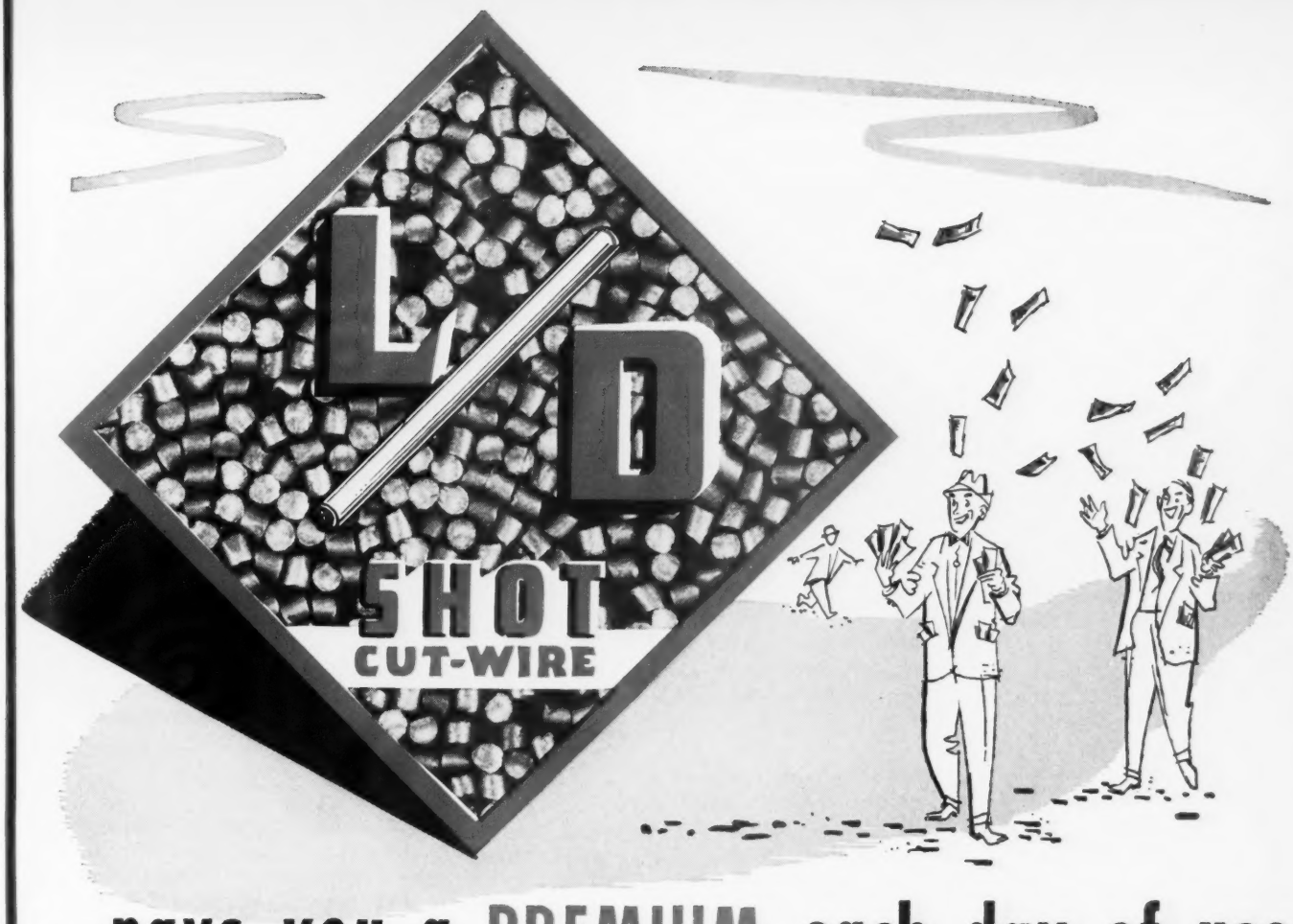
The speaker referred to personal consumption as by far the most important single element in total demand for goods and services. He said that consumers have been adding rapidly to their savings for the last two years; moreover, consumer incomes are at record levels, both in current dollars and in terms of purchasing power, while distribution of both incomes and asset holdings appears wider than even before. These factors point to a vigorous market well supported by buying power and by the intentions of consumers to spend.

Mr. Gainsbrugh pointed out that although government expenditures are declining, commitments already made will keep spending relatively high the next 12 months. In addition, the decline will be at least partially offset by tax reductions now in prospect. Tax reduction is an important valve by which resources freed from engagement in defense activity can flow back into their normal civilian activity.

"This transfer of resources from defense to civilian employment is the basic problem of the short-term outlook," the speaker concluded. "In the light of the favorable financial status of the personal sector and its outlook for long-term growth, I think we are entitled to hope that the transition ahead will warrant the title of a 'rolling readjustment' rather than a serious or major recession."

(*Continued on page* 156)

View of the Alumni banquet held prior to opening of the National Foundry Association meeting in New York



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SUBSIDIARY OF AMERICAN-MARIETTA COMPANY

2705

(*Continued from page* 154)

Every business organization is engaged in some form of marketing research, although the practice still is in the process of early development, it was stated by Frank Juraschek, assistant director, distribution and availability, United States Steel Corp. Market research is intended to show not only where, how and what products can be sold, but also how a sales organization is meeting its opportunities. Intelligent market research requires getting out in the field to collect the necessary data; it can't be accomplished in an ivory tower, the speaker said. It is a mistake to develop a new product without studying the market in which it is intended to be sold, he added.

No safety program can be successful unless it is continuous and has the co-operation of top management and supervisors, it was stated by W. J. Smale, vice president, Michigan Mutual Liability Co., in speaking on "Management's Responsibility Towards Safety and Air Pollution." He recommended that the safety program be designed to fit the individual plant; however, in all instances effectiveness of the program depends more on the attitude of the workers than on the number of safety devices provided.

Mr. Smale recommended the keeping of accurate records on how accidents occurred so that preventive measures can be applied. He also urged that care be taken in the selection and placement of new employees. A physical examination, including chest x-ray, should be given before hiring.

Ventilating equipment installed in the foundry will not do its intended job unless given regular maintenance. Taking of air samples periodically is advisable as a check on atmosphere contamination.

One meeting session was devoted to a labor-management panel discussion and open forum. Under the direction of J. Noble Braden, executive vice president, American Arbitration Association, as moderator, the panel included: Paul Arnold, resident manager, United States Pipe & Foundry Co., Chattanooga, Tenn.; Harry J. Kelley, director of industrial relations, American Seating Co., Grand Rapids, Mich.; Harry Southwell, president, Local 174 United Auto Workers (CIO); David Feller, assistant general counsel, United Steelworkers of America (CIO).

Discussion covered such subjects as the National Labor Relations Board's hearing on the separation of crafts from plant-wide bargaining; conflict between state and federal jurisdiction relative to Taft-Hartley provisions; definition of supervisors; bargaining responsibilties of labor and management while contracts are in effect; pensions; types of arbitration to specify in contracts. Audience participation in the discussion helped to amplify opinions expressed in this most interesting session.

At the NFA meeting. Left to right: Mrs. W. S. Brunk; Harry Ladwig, Allis-Chalmers Mfg. Co.; Frank Sherwin, Chicago Hardware Foundry Co.; Mrs. Herman Menck; Herman Menck, Harnischfeger Corp.; Mrs. Ladwig; W. S. Brunk, NFA president; Mrs. A. V. Martens; A. V. Martens, Pekin Foundry & Mfg. Co.; Mrs. Sherwin. *Below*—Standing, left to right; Charles T. Sheehan, NFA executive secretary; Mrs. Sheehan; Lewis Essex, Golden Foundry Co.; George Rose, NFA Indianapolis counsel. Seated: Mrs. Golden, Mrs. Essex, Mrs. Rose

Review Foreign Policy

A comprehensive review of our foreign policy by Senator Alexander Wiley of Wisconsin featured one of the luncheon sessions. Senator Wiley, who is chairman of the Senate Foreign Relations Committee, emphasized that our security is closely linked to that of other free nations—if only because we are self-sufficient in relatively few of the minerals vital to industry. He said that our assistance to western Europe saved those countries from Soviet domination and that our intervention in Korea may well prove to have been the decisive factor in the prevention of a third great war.

As to the Far East in general, the senator thinks we should: Use our influence to help develop the concept of collective security there; announce that armed aggression is of concern to us wherever it may occur and that we will take whatever action our national interests may require; continue our mutual aid programs with those countries determined to remain free; and do everything we can to convince the people of the Far East that their destiny and national aspirations can best be achieved on the side of the free world.

Speaking at the concluding luncheon on "Incentive Management," James F. Lincoln, president, Lincoln Electric Co., Cleveland, discussed the benefits which accrue to workers, management and stockholders under an incentive system such as his company has used the last 19 years. During that period there has been a 90 per cent reduction at Lincoln Electric in man-hours required per unit production; wages, including bonuses,

(*Concluded on page* 237)

telling the story of 'dag' dispersions

Does This Parting Compound Have Special Properties You Need?...

'dag' Colloidal Graphite—Forms tenacious *dry lubricating film* that is micronically thin, exceptionally slippery. Prevents sticking, speeds parting, assures smooth castings.

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For Chills—'Aquadag', a dispersion of colloidal graphite in water, assures good parting, increases cooling effect of the chill. . . . **For Permanent Molds**—Colloidal graphite application increases mold life, assures superior reproduction of castings. . . . **For Cores** — Coating obtained with 'Aquadag' helps parting and chilling. Film is so thin that there is no build-up. . . . **For Shoulder Screws**—'Oildag', a concentrated dispersion of colloidal graphite in oil, eliminates all carbon formation, assures free movement of parts at all times. . . . **In Other Applications**—For cavities, gates, runners, risers, base plates, patterns, flask pins, push pins . . . generally wherever a superior parting compound is required. Learn more about 'dag' dispersions for foundry operations. Write *today* for Bulletin No. 425-14L.

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ORDERS for ferrous castings are not as large as had been anticipated this fall and as a result the majority of jobbing foundries and some captive shops are operating on slack schedules. The situation is quite spotty but melting in this area probably doesn't average over 65 per cent at present.

Steel foundry volume is holding up better than gray iron and malleable iron. Reason for this is that steel castings are for the most part used in heavy capital goods equipment built on long-term contracts. Gray iron castings have their widest application in consumer goods, and to some extent this is true for malleable castings. Thus, orders for them are quickly sensitive to rising or falling demand for these goods.

Requirements for castings suffered first this year from lowered output of farm equipment, a decline that has deepened as the year advanced. More recently shrinking production of automobiles and household appliances has developed to reduce the need for castings.

In this column a month ago it was hinted that increased production of pig iron and shrinking consumption not only had effected a supply-demand balance at long last but was making for an easiness that could grow in coming months. That prediction is being borne out.

At present, not all merchant blast furnace capacity is being utilized. Neither does steel ingot output require all the blast furnace hot metal that captive units can turn out. This means that some steel mills are in a position to sell pig iron to foundries. Foundry coke continues to be in abundant supply too.

Remainder of fourth quarter appears to offer little hope for a significant reversal of trend. By first quarter, however, new automobile models will be rolling off assembly lines in heavy volume again. All of this adds up to more competition among foundries to get orders for castings and among suppliers of raw materials to foundries.

In mid-September Defense Secretary Wilson and Air Force Secretary Talbott announced a deep slash in aircraft engine contracts. The cut permits the Aircraft Engine Division of Ford Motor Co. in Chicago to continue production. The plant will stop production of the Pratt & Whitney R-4360 piston engine soon and will start making the new Pratt & Whitney J-57 jet engine. Latter engine will be used in the new F-100 jet fighter, the F-101 long-range escort fighter and B-52 heavy bomber.

Late in August Ford Aircraft shipped its one-thousandth R-4360 engine. The first had been shipped in March 1952. As the thousandth reciprocating engine was shipped, the Division's J-57 jet manufacturing areas were busy rushing the newest phase of the production program. An early 1954 production date is being aimed for. For some time, the magnesium foundry has been producing castings for the new engine. In fact, before midyear the foundry had completed its quota of castings needed for pilot machining and assembly operations.

Los Angeles

FOUNDRY activity has quickened and foundrymen are optimistic that the year's sales will end up just under last year's. September sales showed a slight gain over those of August. Nonferrous and steel foundry activity lags.

Sales of refractories and foundry cupola equipment of one supplier were 15 per cent less in the third quarter compared with the preceding quarter. However, sales to date are only slightly less than for the like period in 1952.

Iron foundries, on 5-day, 40-hour work schedules, are running close to "normal" operations with their backlogs 1-2 months compared with 2-3 months last year. Foundry customers are not ordering as far ahead as previously and are insisting on quicker deliveries. Casting users are generally becoming more critical of casting quality and delivery performance, and are demanding all the service they can get, according to foundrymen. Most foundrymen are meeting this demand by improving casting quality and deliveries.

Of vital interest to local foundrymen is the current increase in concern over smog conditions in Los Angeles County. Public clamor for the authorities to "do something about smog," plus prodding by the Los Angeles County Medical Association, has erupted in a barrage of statements by public officials calling for a "quick solution to the problem." The target for most of the criticism is Gordon Larson, head of the Los Angeles County Air Pollution Control District, whose group has been working on smog abatement for the last six years under legislation generally conceded as model.

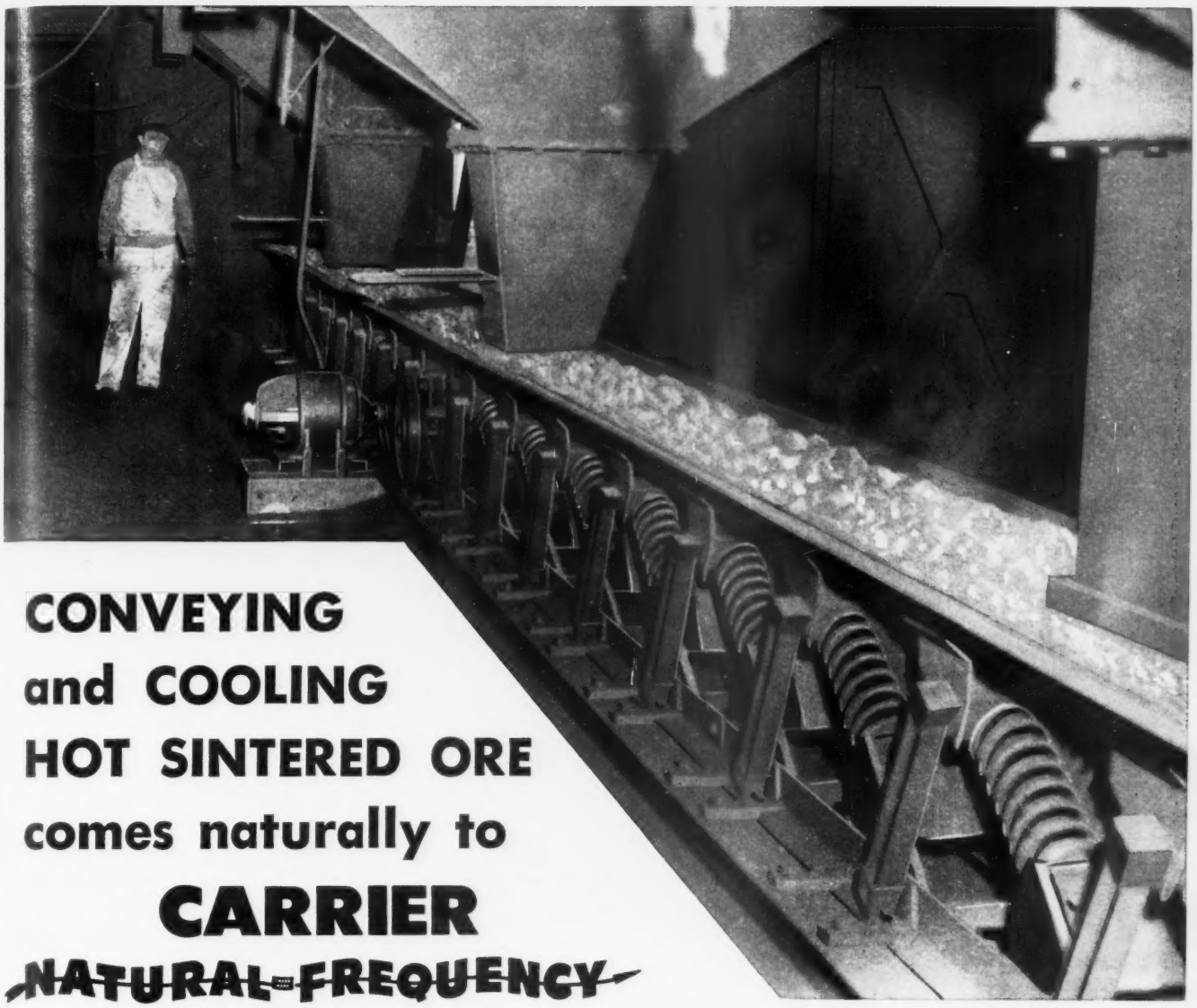
In 1951, smog officials and the local gray iron foundries were at loggerheads over smog regulations defining minimum smoke emission standards set in 1948. After conducting an extensive research program of their own, the gray iron foundries decided that smog abatement equipment that was acceptable to the authorities was inefficient. They were slow to comply, but in 1951 most of the 61 operating gray iron foundries installed some kind of smog abatement equipment, usually at great expense. Now, foundrymen are wondering whether the new "look" on smog might result in "obsoleting" their anti-smog equipment.

Detroit

A PALLOR has settled over the foundry industry in and around Detroit. Some foundries are working as little as three days a week with the majority on four and a few working five. Not many foundries report extensive backlogs compared with the almost-universal high backlogs reported only a few months ago.

Several factors may be cited as

(*Concluded on page* 160)



CONVEYING and COOLING HOT SINTERED ORE comes naturally to CARRIER ~~NATURAL-FREQUENCY~~ CONVEYORS

Carrier Natural-Frequency Conveyor in Alan Wood Steel Co. plant, Conshohocken, Pa.

Conveying and cooling up to 40 tons of hot sintered ore an hour is a "natural" for Carrier Natural-Frequency Conveyors. The 57-foot unit in Alan Wood Steel Company's Conshohocken plant, above, is powered by one 7½ H.P. drive and has a one-piece steel-plate pan, ½" thick. It receives the 700° (F.) ore from hoppers, then quickly vibrates it to storage with a gentle, abrasion-free motion. The conveying speed is 90′ per minute.

Notice that no water jackets are required for cooling — the conveyor's spring hangers have air-gap insulation spaces that not only cool the pan and ore, but also eliminate the possibility of corrosion and leakage!

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Hundreds of America's leading industrials are now using Natural-Frequency Conveyors and processing equipment for many hard-to-handle products — things like limestone, coke, mill scale and slag . . . cement clinker . . . castings . . . machine turnings . . . sand . . . minerals . . . plastics . . . bulk chemicals . . . food products. If *you* handle "tough" materials — anything hot, sharp, wet, abrasive, friable, brittle, stringy, jagged or oily — it will pay you to get the whole Natural-Frequency story. Mail the coupon, *today!*

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Att: Mr._____ Dept._____

(*Concluded from page* 158)

contributory to the condition. One is the Livonia fire which has slowed auto production at Oldsmobile, Pontiac and Nash; halted it completely at Lincoln. Another is the normal seasonal halt in auto production as the automakers change over to new models. And while dies for some 1955 cars are already being cast at some foundries, the full swing of this business is yet to come.

GRAY IRON shops are having difficulty in sustaining the modest backlogs they had this summer. Most foundries have not more than three weeks backlog and some not even that. Operations are largely on a five-day week basis.

Steel foundry business continues to lag, reflecting particularly cutbacks in the defense program. Operations are still being well sustained, but backlogs are shrinking. Some report backlogs of four to five weeks and in at least one case, a foundry that had been operating three shifts is now back to two shifts.

This lag in defense work is also affecting nonferrous shops, excepting those which work in aluminum and magnesium. However, most of the brass and bronze shops so far are able to operate five days a week.

Malleable foundries are averaging around four days a week. Demand for pipe fittings is fairly well sustained, but hardware requirements are slow and not much work is coming in from the railroads or agricultural equipment manufacturers. Fortunately, cutbacks in defense work, are having little bearing, as this has not been much of a factor at best in malleable or in gray iron.

Raw materials are in ample supply. This applies particularly to pig iron, scrap and coke. Scrap prices show further weakness and in pig iron, two district producers have dropped their prices $2 a ton within the past few weeks. Foreign pig iron prices also are easier, with an increasing tonnage coming in from Sweden. It is reliably reported that approximately 30,000 tons of this iron, which is high phos (.80 to 1.10), has been sold in this country within the past two and a half months or so. Late offerings are understood to be around $47, f.o.b. cars, Philadelphia, duty paid. Incidentally, prices on Swedish iron at the Gulf ports are said to be $2 to $3 less.

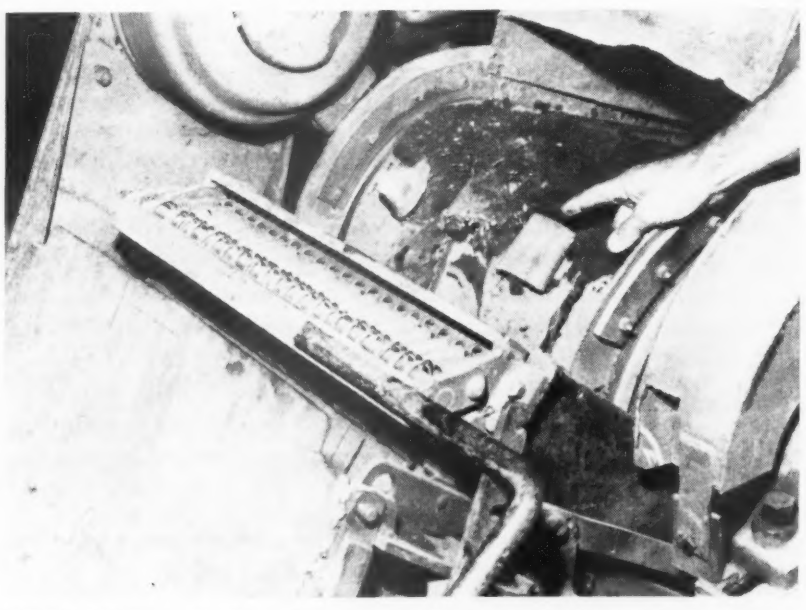
FOUNDRYMEN generally show disappointment over fall business. There has been little or no pickup, and while some see a little improvement ahead, they are the exception rather than the rule. Few gray iron shops are doing better than four days a week and those who are operating on a five-day schedule admit they could do better within the limits of such a schedule if they had more work.

Backlogs, averaging no more than three weeks at best, are, if anything, a shade down from last summer, although that might be explained in part by the fact that production then was somewhat disrupted by vacations and hot weather.

Steel foundries are sustaining fairly high operations, but at the expense of backlogs. Defense work, which contributed much to steel casting business during the Korean war, has lagged perceptibly over recent months. Backlogs have fallen to a point where deliveries are being offered in four to five weeks. Malleable shops, which at no time were much affected by defense business, report little change in bookings. Their backlogs range three to four weeks and the present feeling among the operators is that they will be lucky if they can maintain even this volume.

Brass and bronze shop operations are spotty. Certain of the captive shops and at least one or two foundries specializing in machine parts are doing fairly well. But in general business is far from brisk.

Raw materials are in free supply, with prices soft.



SCRAP SAVER: Charlotte Pipe & Foundry Co., Charlotte, N. C., has installed a permanent magnetic pulley in its sand conditioner. Roughly 160 tons of sand are cleaned per day with about 14,000-lb of tramp iron being removed weekly. View above shows several pieces of iron which have been removed from the sand. The magnetic pulley is manufactured by Eriez Mfg. Co. and is mounted on a Royer Foundry & Machine Co. conditioner

Engineering Scholarships Are Established

Eleven cooperative scholarships for work in metallurgical and mechanical engineering have been established by Armour Research Foundation of Illinois Institute of Technology for students who will enter IIT in February, 1954.

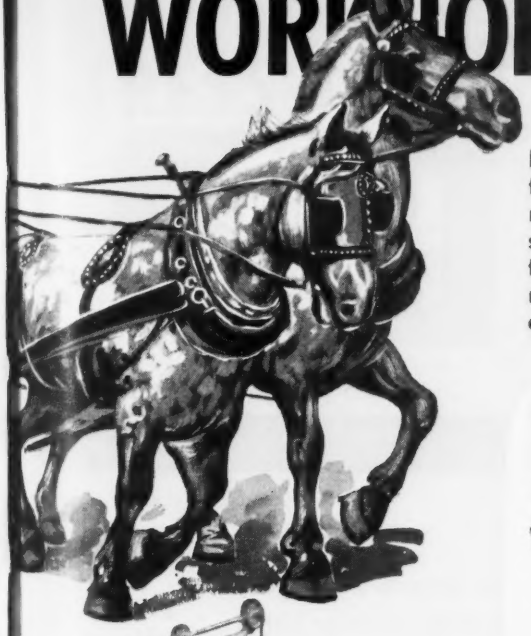
Four of the awards are in metallurgical engineering and the rest in mechanical engineering.

Under the Foundation's cooperative education program at IIT, the recipients will attend school the semester beginning in February. Their tuition will be paid by the Foundation, and they also will receive $90 a month while in the program.

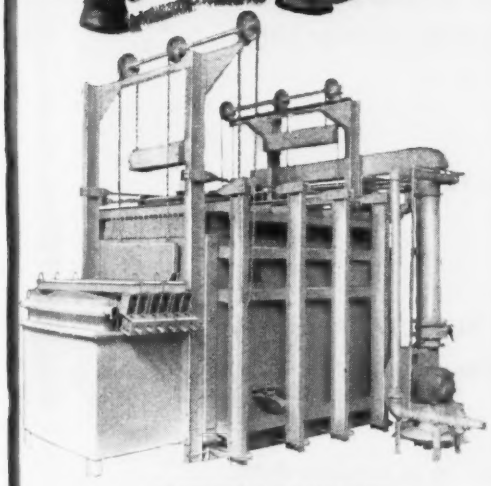
Starting in June, 1954, the students will be employed by the Foundation doing work closely related to their field of study. The students will go to school and work during alternate semesters until they earn their degrees.

Further information may be obtained from the Personnel Manager, Armour Research Foundation of Illinois Institute of Technology, Technology Center ,Chicago 16.

WORKHORSES for ALUMINUM

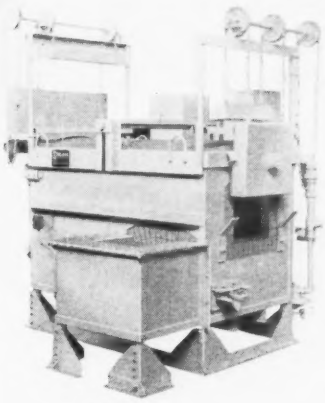


Here are the furnaces that bear the brunt of the burden in the aluminum foundry industry. They are designed for production of unsurpassed quality metal, in the fastest, most efficient and economical manner. Each has its specific purpose and capacity, meeting the exacting demands of sand foundries, die casters, permanent mold plants and smelters. They are recognized as the finest in the industry, reduce costs and make working conditions most agreeable. All furnaces may be fired by either gas or oil.



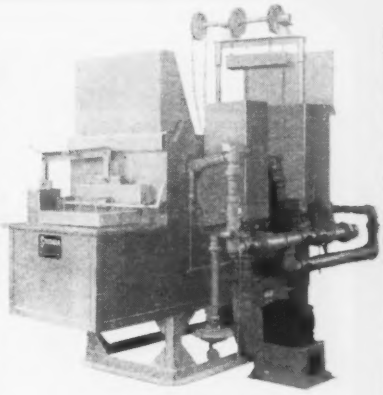
SMELTERS FURNACE

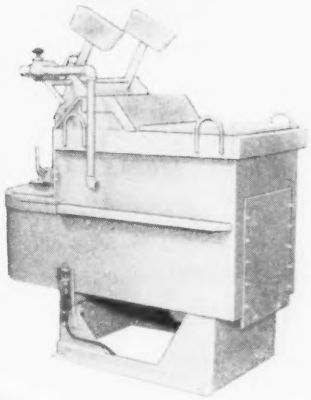
Built especially for smelters and other large melters. Easy charging, drossing, fluxing and alloying. Can be built to your own specifications. Capacities from 3000 lbs. Aluminum up.



MODEL "DC" FURNACE

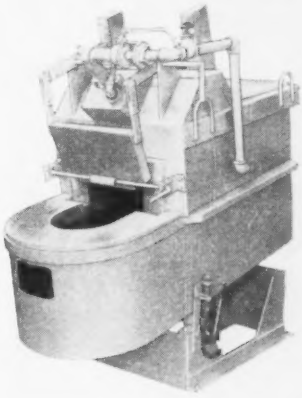
The 2 in 1 furnace. Breakdown and Holding in the same unit. Cold metal never reaches the molten bath. Assures metal of the finest quality on all classes of work. Close temperature control. Can be used as a sweat furnace for reclaiming inserts. Ideal for all types of plants including sand, permanent mold and die casting. Capacities from 350 lbs. Aluminum up.

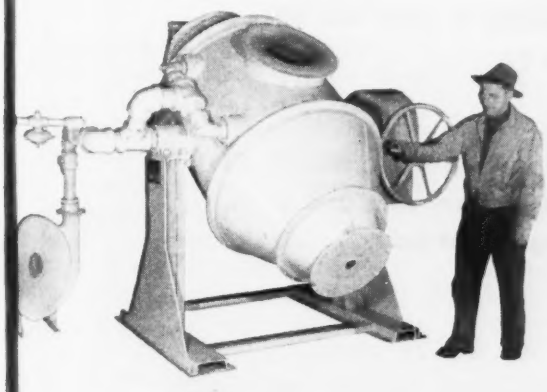




MODEL "DSC" DIE CASTING FURNACE

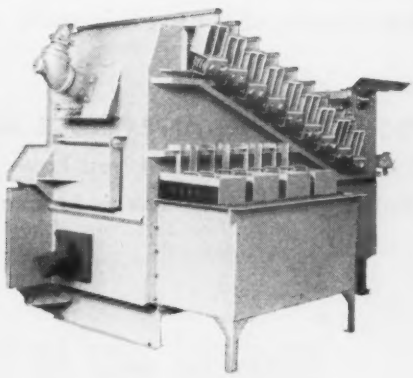
A small reverberatory furnace for melting and holding, or for holding only when hot charged at the die casting machine. Made in various sizes to meet your requirements.





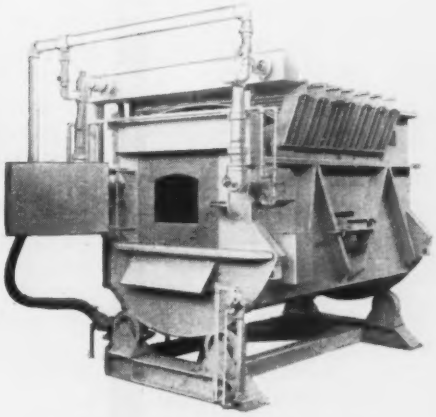
MODEL "BFC"

Hand tilt, open flame, barrel type furnace with flames firing tangent to inside of lining. Very fast melting. Used in all type plants including smelters. Capacities—500 lbs. Aluminum. A must for all aluminum jobbing sand foundries.



MODEL "MC" DIP-OUT TYPE

For melting and holding all in the same furnace. Hot metal always available. No iron pots or crucibles to replace. Capacities from 500 to 5000 pounds of aluminum.



MODEL "SW"—TILTING TYPE

Excellent to run back returns along with ingot required for permanent mold, die or sand casting operations. Also an ideal breakdown furnace. Capacities—600-1000-1700-3000 lbs. Aluminum.

STROMAN FURNACE & ENGINEERING CO.

DIVISION OF

THE PETERSEN OVEN CO. • 9900 FRANKLIN AVE. • FRANKLIN PARK, ILL.

YOU NEED THE BEST CORE WASH

Buy MEXADIP™

- **MEXADIP WILL NOT FERMENT. You will not have to dump your wash because of hot humid conditions — no pock marks or pitted coating surfaces with MEXADIP.**

- **MEXADIP STAYS IN SUSPENSION. Let it stand over the week end, it will be ready to go Monday morning.**

- **MEXADIP WILL NOT RUN, BUILD UP OR RUB OFF. It applies equally well on either green or baked cores.**

- **MEXADIP IS DEPENDABLE AT ANY BAUME. It is applied daily to cores for thousands of tons of castings over a range of 10-40 degrees Baume.**

- **MEXADIP REQUIRES NO LONG "PASTE" MIXING. No waiting period is necessary. Just add the powder to water and after a few minutes of stirring it is ready to go.**

IMPROVE CASTING APPEARANCE AND SAVE MAN HOURS IN THE CLEANING ROOM. If you have a problem with core wash, MEXADIP will solve it. Ask us to arrange a test today.

Why wait . . .
Start now — Use MEXADIP™

THE UNITED STATES GRAPHITE COMPANY

DIVISION OF THE WICKES CORPORATION • SAGINAW, MICHIGAN

STRESS INDUSTRY SELLING PROGRAMS

At Malleable Founders' Society Meeting

By FRANK G. STEINEBACH
Editor

WHEN George T. Boli, president, Northern Malleable Iron Co., St. Paul, became president of the Malleable Founders' Society in June, he stated that the main emphasis of society's activities during the year would be placed on selling. How well this course has been followed was illustrated by reports, discussions and talks at the general society meeting held at the Hotel Cleveland, Cleveland, Sept. 25.

The Advertising Committee reported that a program has been developed and approved, an advertising agency selected, and that the first co-operative advertisement in the new campaign will appear in five business publications during October. Reprints of the individual advertisements for mail distribution by those foundries interested in tying in to the program will be available to members through the society headquarters.

John Wilson, Carr Liggett Advertising Agency, outlined the objectives of the campaign: 1—Educate key people in the metal field in the application of malleable iron; develop profitable uses; and promote the name of the Malleable Founders' Society as a progressive factor in the metalworking industry. Mr. Wilson stated that every effort would be made to evaluate the results of the campaign.

Advises Research Analysis

Speaking on "Is Your Selling Job in Balance with Your Market Potential," Russell C. Jaenke, vice president and director of advertising, Penton Publishing Co., Cleveland, advised a thorough research analysis of current and future markets for malleable castings. Mr. Jaenke stressed the fact that in 1952, better than 78 per cent of the production of malleable castings went to producers of automobiles, trucks and accessories, railroads, agricultural implements and pipe fittings and parts. With other forms of manufactured products as well as other types of castings competing for this business, the speaker questioned if the malleable industry was getting its share of business from these fields. If the suggested study shows that the potential is not being realized, it is time for the industry to do something about it.

Reporting for the Education Committee, C. L. Liebau, Federal Malleable Co., West Allis, Wis., expressed gratification on the reception given the recently published booklet for high school and vocational school students entitled "The Malleable Iron Foundry and You." Reports indicate that the booklet is creating interest in the malleable foundry industry as a place to work. Mr. Liebau emphasized, however, that even better results can be obtained only through the continued distribution of the booklet by member companies. Mr. Liebau also reported that new material on malleable iron had been submitted for nine textbooks and that contact with textbook and handbook authors and universities will be continued.

GEORGE T. BOLI
President, Malleable Founders' Society

G. R. Stevenson, Acme Steel & Malleable Iron Works, Buffalo, reporting for the Personnel and Operations Committee, announced a safety contest for employees of malleable foundries. Prizes will be awarded for the best letters dealing with any one of the following three topics: 1—What One Individual Employee Can Do To Help in a Safety Program; 2—Operation of a Safety Program; 3—Human Side of Safety Statistics. The contest closes Nov. 30 and the winner will be introduced at the general society meeting to be held in Cleveland Jan. 22, 1954. Judges will be Paul Jones, director, public relations, National Safety Council; Lowell D. Ryan, managing director, Malleable Founders' Society; and Frank G. Steinebach, editor, FOUNDRY. Mr. Stevenson urged members to give the contest as much publicity as possible in the individual plants.

James H. Lansing, technical and research director, reported on the work that has been done on gating and feeding during the past three months. Much of the work is being done on a co-operative basis in the individual plants. Mr. Lansing also stated that a special report has been prepared for inclusion in the published transactions of the recent ASTM symposium on "Lower Temperature Behavior of Metallic Materials."

Urges Conference Attendance

Lowell D. Ryan, managing director, paid tribute to the tremendous amount of effort that has gone into the preparation of the program for the Personnel Conference scheduled for Niagara Falls, Oct. 16-17. He urged attendance of all individuals handling personnel problems in individual plants. Mr. Ryan also urged support of the safety contest. He stated that a Program Committee has developed a list of subjects to be submitted to the membership to determine the topics that should be discussed at future meetings. Mr. Ryan also reported on the survey on conversions to malleable iron and indicated that while the results thus far received have been quite gratifying, more companies should be urged to participate in the study in order to increase its value.

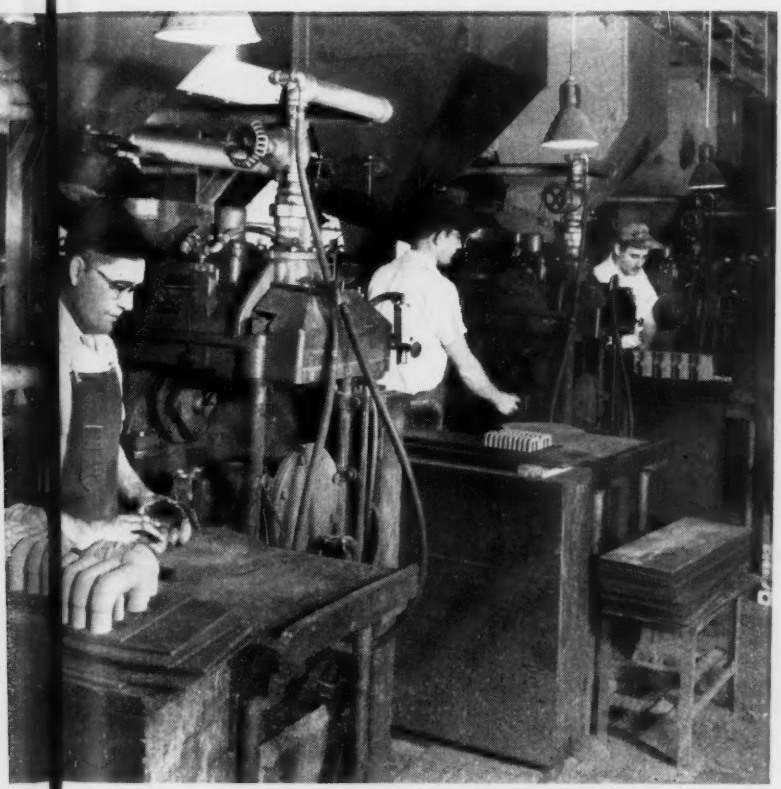
Harvey E. Steinhoff, Wagner Malleable Iron Co., Decatur, Ill., reporting for the committee on the revision of the handbook, recommended that an entirely new edition of the handbook be prepared. Since the supply of the present edition is almost exhausted, and some of the data is obsolete, the committee recommended an immediate start on a new edition. Special emphasis should be made on improving the appearance and appeal of the handbook.

(Concluded on page 166)

Osborn Automatic Core Blower,
Model 91-26.

THE OSBORN MANUFACTURING COMPANY
5401 Hamilton Avenue Cleveland 14, Ohio

M CO. BLOWS 135,000 CORES A DAY
ORN AUTOMATIC CORE BLOWERS



135,000 QUALITY PIPE FITTING CORES DAILY come down this conveyor on their way to the oven at Grabler Mfg. Co., Cleveland, Ohio. Flanking both sides of this conveyor are 29 completely automatic Osborn Core Blowers, as shown above, turning out peak production at minimum cost.

A BLOWN core box every 6 seconds using two core boxes per machine. That's the rate of production turned out on each Osborn automatic core blower at Grabler Mfg. Co., Cleveland, Ohio.

The automatic core blowing cycle is initiated when the empty core box is placed in blowing position. The machine cycle is terminated 3½ seconds later with the blown core box ejected from the machine. While one core is being blown, the operator strips the other core box.

INVESTIGATE THE FACTS

If your problem is cutting costs of cores or molds, remember, Osborn has a complete line of molding machines and core blowers. A factory-trained Osborn molding specialist near you will gladly analyze your operations and recommend the most efficient equipment from Osborn's complete line. Call or write us . . . today.

OSBORN®

MOLDING MACHINES

CORE BLOWING MACHINES

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

(*Concluded from page* 163)

Mr. Steinhoff reported that the matter was presented to the board of directors the previous day and that funds were appropriated to start the complete revision.

William N. Davis, director, safety, and hygiene and air pollution, American Foundrymen's Society, reported on the activities of that organization. He pointed out that the work is being undertaken through the complete co-operation of the various trade and technical associations in the foundry industry operating through the National Castings Council. Five working committees and a steering committee are functioning and considerable progress has been made. The Safety Committee has completed approximately 75 per cent of the revision of the Foundry Safety Manual, and this will be completed and published shortly. A safety course for foundry management personnel has been developed and is being presented in numerous foundry centers.

The committee on Dust Control and Ventilation is developing a new manual and the Air Pollution Committee is developing a manual and doing considerable testing and development work in the field. A pamphlet also is being prepared dealing with emission control from melting operations. Mr. Davis urged continued interest in the program by all foundrymen.

Offers Research Reports

Developments in foundry methods are described in reports of government-supported research made public by the Office of Technical Services, U. S. Department of Commerce, Washington 25, in its monthly publication, *Bibliography of Technical Reports.*

They include: "A Study of the Effect of Various Binders and Additives on the Hot Strength of Molding Sands," PB 101393, price 75 cents. "Bibliography of Motion Pictures and Film Strips, Foundry Practice," PB 105715 and PB 105715s, 50 cents each. "Ultrasonic Measurement of Wall Thickness in Diesel Liners," PB 111136, 50 cents.

Magnesium Group Meets

Ninth annual meeting of the Magnesium Association, New York, will be held Nov. 2 and 3 at Biltmore Hotel, New York. The Casting Division session on the morning of Nov. 2 includes papers on "Magnesium Die Castings" and "Some Foundry Characteristics of Magnesium Alloys Containing Thorium." A panel discussion also is being held on "Service Experience, Magnesium Alloys for Commercial Applications."

Monday's luncheon address, "Where Do We Go from Here?" is by Hanson W. Baldwin, *New York Times,* one of the foremost military analysts in the country. Afternoon session deals with "Designing Magnesium Products" and "Performance Data: Stainless Steel Wire Screw Thread Inserts in Magnesium Applications."

Papers on "Use of Metal Adhesives with Magnesium," "Finishing Systems for Magnesium" and "Magnesium Alloy Back Extrusions" are featured during the morning of Nov. 3. A general discussion and election of officers are scheduled for the afternoon.

Meetings of Interest to Foundrymen

Nov. 2-3—Magnesium Association, annual meeting, Biltmore Hotel, New York

Nov. 4-6—Steel Founders' Society of America, T & O Conference, Carter Hotel, Cleveland

Nov. 4-6—Industrial Management Society, annual time and motion study and management clinic, Sheraton Hotel, Chicago

Nov. 4-6—Meehanite Metal Corp., annual research meeting, Hotel Cleveland, Cleveland

Nov. 5-6—Annual Pittsburgh Diffraction Conference, Mellon Institute, Pittsburgh

Nov. 6-7—Non-Ferrous Founders' Society, board of directors meeting, Benjamin Franklin Hotel, Philadelphia

Nov. 30-Dec. 5—Exposition of Chemical Industries, Commercial Museum and Convention Hall, Philadelphia

Dec. 3-5—American Institute of Mining & Metallurgical Engineers, electric furnace steel conference, Netherland-Plaza Hotel, Cincinnati

1954

Jan. 22—Malleable Founders' Society, general society meeting, Hotel Cleveland, Cleveland

Jan. 25-28—Plant Maintenance & Engineering Show, International Amphitheater, Chicago. The **Plant Maintenance & Engineering Conference** will be held concurrently at the Hotel Conrad Hilton, Chicago

Feb. 1-5—American Society for Testing Materials, committee week, Hotel Shoreham, Washington, D. C.

Feb. 11-12—Wisconsin Regional Foundry Conference, Schroeder Hotel, Milwaukee

Feb. 18-19—Southeastern Regional Foundry Conference, Patten Hotel, Chattanooga, Tenn.

Mar. 10-11—Foundry Educational Foundation, annual conference of advisory committees and annual meeting, Hotel Cleveland, Cleveland

Mar. 15-19—National Association of Corrosion Engineers, tenth annual conference and exhibition, Kansas City

Mar. 16-17—Steel Founders' Society of America, annual meeting, Edgewater Beach Hotel, Chicago

Apr. 5-7—American Institute of Mining & Metallurgical Engineers, national open hearth conference, Palmer House, Chicago

Apr. 8-9—Malleable Founders' Society, market development conference, Carnegie Institute of Technology, Pittsburgh

May 4-7—American Welding Society, national spring technical meeting, Hotel Statler, Buffalo

May 5-8—American Welding Society, welding and allied industry exposition, Buffalo Memorial Auditorium, Buffalo

May 8-14—American Foundrymen's Society, annual convention and exhibition, Public Auditorium, Cleveland

May 17-20, Basic Materials Exposition, International Amphitheater, Chicago

June 14-15—Malleable Founders' Society, annual meeting, Seigniory Club, Province of Quebec, Canada

June 14-18—American Society for Testing Materials, annual meeting, Hotels Sherman and Morrison, Chicago

Sept. 27-28—Steel Founders' Society of America, fall meeting, Greenbrier Hotel, White Sulphur Springs, W. Va.

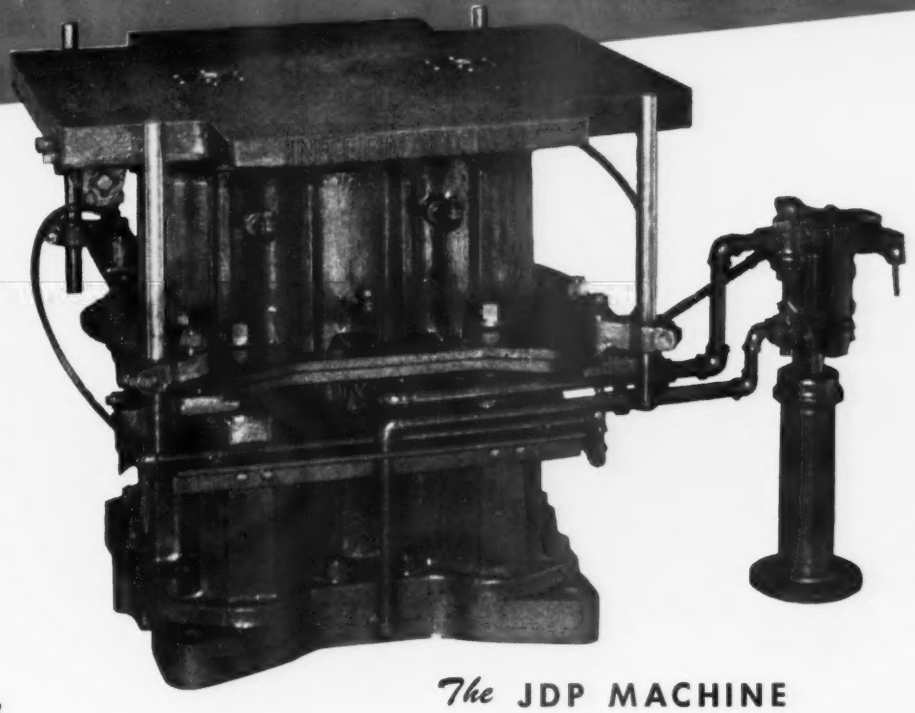
Sept. 29-Oct. 1—National Foundry Association, annual meeting, Edgewater Beach Hotel, Chicago

INTERNATIONAL TYPE

JDP MACHINE

The JDP has the exclusive Double Jolt Feature. A **Positive** Jolt and a **True** Ram.

TWO JOLT SECTIONS combined in one integral unit.



The JDP is adaptable to a large range of work, suitable to the pin lift style. It is readily adjustable. The incorporation of the Double Jolt Feature, combined with the sturdiness of the machine, gives a positive ram throughout the mold.

The lifting section is guided by hardened steel parts for long lasting wear. All valves are conveniently located for ease of operation. Wearing parts can be readily replaced.

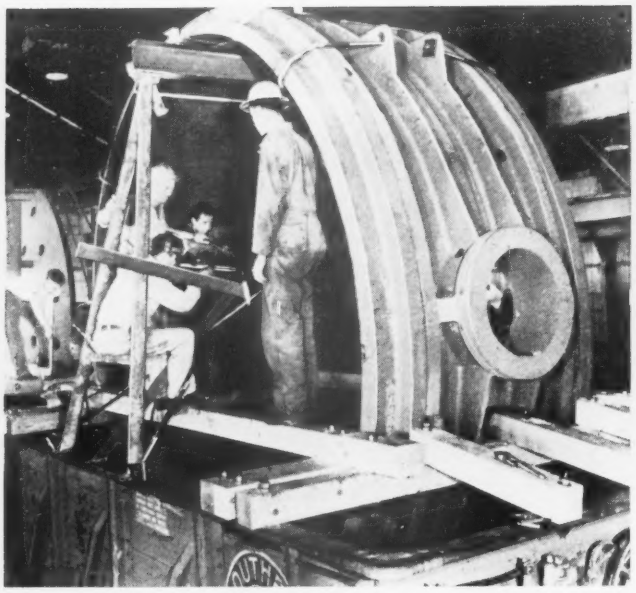
The JDP MACHINE

by

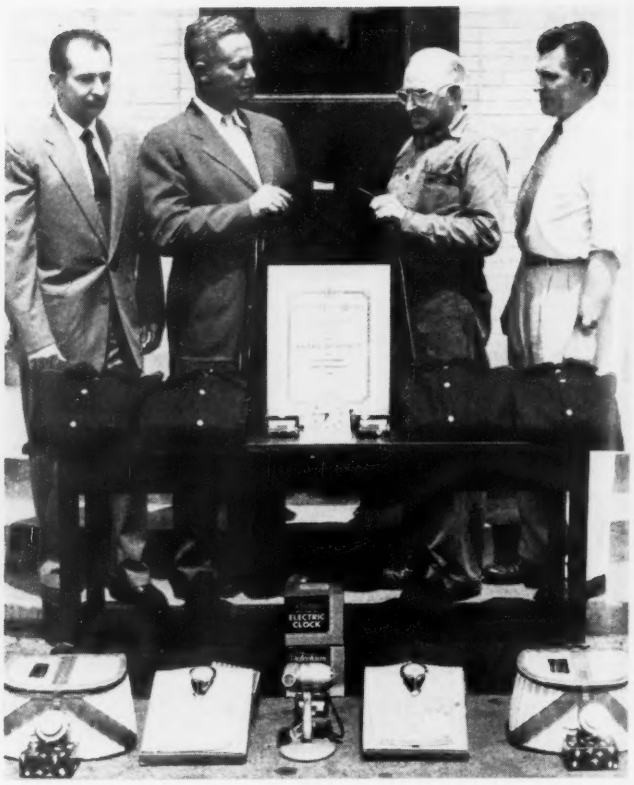
INTERNATIONAL

International Molding Machine Company • La Grange Park, Illinois

News Views

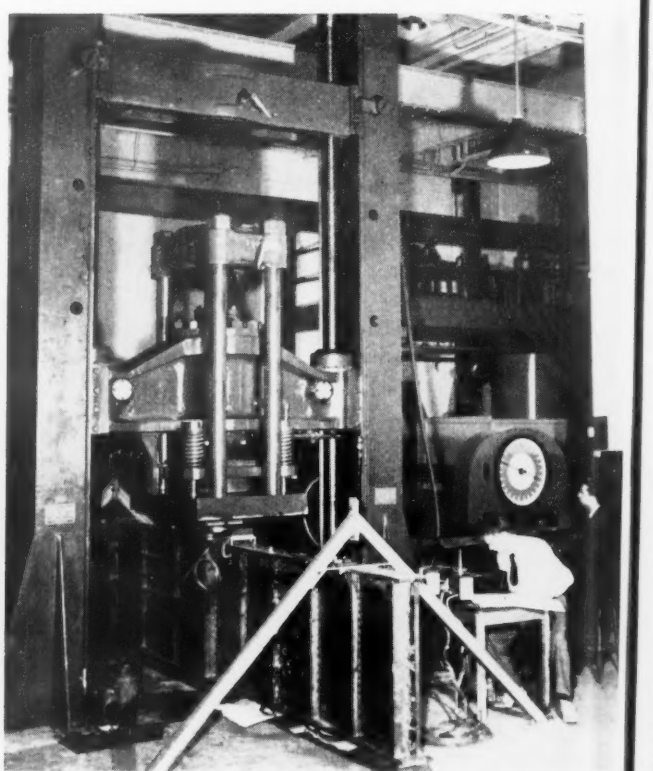


BIG BUTTERFLY: Components of a 70,000-lb, 156-in. butterfly valve assembly are shown being loaded for shipment at the Torrance, Calif., plant of National Supply Co., where they were manufactured. In the foreground, sandwiched between two 7000-lb body flanges, is the 26,000-lb casting of the body. Farther back in the car is a 30,000-lb disk. After machine work by Westinghouse Electric Corp., the assembly will be operated by Pacific Gas & Electric Co.



SAFETY PAYS OFF: William E. Harvey, vice president of production, Speer Carbon Co., St. Marys, Pa., hands the first of 535 safety award gifts to Clarence Lowe for his part in the plant record of 372 working days without a lost-time accident. Helping are Fred D. Martin, plant manager, left, and Bertil L. Anderson, safety director, right

INTO THE WILD BLUE YONDER: Ottawa Silica Co., Ottawa, Ill., will use this model 180, 4-passenger Cessna for sales work, trouble shooting in the field, quick pickup of light equipment parts and for experimental and research work. The all-metal monoplane cruises at over 150 mph and is equipped for instrument flight. Left to right are H. C. Thornton, James C. Lockwood and Wayne B. Gyger



UNIVERSAL TEST MACHINE: Installed at McGill University, Montreal, by Baldwin-Lima-Hamilton Corp., Philadelphia, this 400,000-lb load capacity universal hydraulic testing machine will be used for research, undergraduate work and industrial testing of castings and other equipment

HERE ARE YOUR KEYS TO DESIGNING FOR LOW-COST PRODUCTION—

See for yourself

HOW "PRODUCTION PROCESSES" CAN HELP YOU SOLVE DESIGN-PRODUCTION PROBLEMS

"PRODUCTION PROCESSES"

THEIR INFLUENCE ON DESIGN

VOLS. I & II

By Roger W. Bolz

COVERS THESE 9 BIG PRODUCTION AREAS

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Mass Production and Design
Metal Removal Methods
Metal Forming Methods
Metal Working and Forging Methods
Metal Deposition Methods

Vol. II

Casting Methods
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The "keys" are two volumes on how you can bring the shop into your design department . . . on how you can actually plan your designs for smoother production. "Production Processes", with 924 pages of authentic text, charts and illustrations covering 56 different shop processes, can help correct your design-production mishaps . . . correct them while the designs are still in the drawing board stage! Here is production know-how in advance and in place of trial and error on the line. Here in two volumes is what design and production men all over the country regard as their "keys" to designing for low-cost production. You get usable information on how to select materials . . . you see the surface finishes produced by the various processes . . . and you find explained the practical tolerances which can be held while using these processes.

Here is a really comprehensive treatment of the production approach to design. See for yourself. Use the handy order form below and get your set *now*.

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Send me both volumes of "Production Processes" by Roger W. Bolz

☐ On ten days trial for free examination. If the books meet with my approval I will pay $15 (plus tax if any). Otherwise, I will return the books in good condition, postpaid.
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*Please add 45c to cover State Sales Tax on orders for delivery in Ohio.

Foundry Developments

By EDWIN BREMER

BRITISH foundry employing the shell molding process eliminates the necessity of fastening the shells together by use of flasks and green molding sand backing. Procedure is to place the drag shell face down on a flat board and place a flask over it. A thin layer of sand is dropped on the shell in the flask from a sandslinger through a bypass or diverter. Bypass then is cut out permitting the remainder of the flask to be filled with sand rammed into place by the centrifugal head of the machine. The whole assembly is rolled over, the cope shell located on top of the drag shell, a flask placed in position and clamped to its lower counterpart with C-clamps. Flask then is filled with sand as previously described. Sprue opening is covered with a metal cup to prevent entrance of sand. Completely filled mold then is placed on conveyor line for pouring. Since the molding sand is used only for the purpose of backing the shells, there is no problem with the disintegrated sand from the shells as that becomes part of the system—bentonite being added from time to time to provide the necessary bond. Only 45 seconds are required to fill a 10 x 12-in. flask.

* * *

EXPERIMENTS by J. V. Dawson, L. W. L. Smith and B. B. Bach on addition of nitrogen to molten cast iron show that it exerts a profound influence on the properties and structures. As described in the June Issue of the *Journal of Research and Development* of the British Cast Iron Research Association, nitrogen additions were made by treating the molten cast iron with fluxed ferrocyanides, cyanamides, etc., obtaining additions from 30 to 500 p.p.m. (0.05 per cent). N has a strong stabilizing effect on cementite and pearlite in a number of types of cast iron even in quantities as low as 100 p.p.m. (0.01 per cent).

In as-cast hypoeutectic and hypereutectic gray irons and nodular irons the amount of combined carbon increases with increasing nitrogen. Graphite flake formation in gray irons is modified, flakes becoming shorter, thicker and more curved. Increase in amount of pearlite in gray irons produces an increase in transverse, tensile and impact strengths. Excess nitrogen can cause porosity. Carbide stabilizing effect also is evident in annealing of malleable iron, times for first and second stage anneal being increased considerably by N. This is accompanied by increase in size and reduction of number of nodules. Small additions of Al reduce these effects; amount of Al required increases with increases in N.

* * *

CONVEYOR hooks which carry automobile cylinder blocks through a continuous shotblasting unit are claimed to wear five times as long when hard-faced with a special alloy containing chromium and boron. Hook shown in the accompanying illustration is coated on each side to the thickness of ¼-in. by arc welding with the hard-facing alloy made by Wall Colmonoy Corp., Detroit. Material has a Rockwell C hardness from 58 to 63, and possesses very good abrasion resistance and excellent impact resistance.

Hard facing on hooks resists wear

* * *

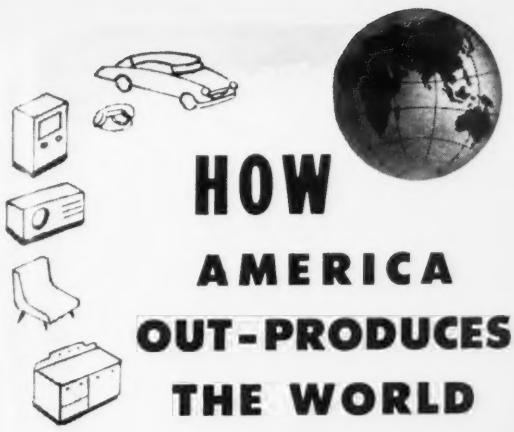
MODIFIED polyester resins are being applied as a core binder with good results. Material is said to be fast baking and yields cores with good hot strength, very good collapsibility, high tensile strength, and high surface hardness. Resin is in liquid form being dissolved in a high-flash mineral oil solvent, and has working properties similar to core oils. Typical mix by weight contains 1.2 per cent cereal, 2 per cent water, 0.8 per cent resin, and 0.5 per cent white kerosene. Dry ingredients are mixed and water added 30 seconds before the resin. After around 3 minutes mixing the kerosene is added, and following 1 or 2 minutes of mixing the batch is discharged. These resins bake at about same rate as phenolic type at 400 to 450°F. Fuel oil should not be added to the mix as it slows down baking rate.

* * *

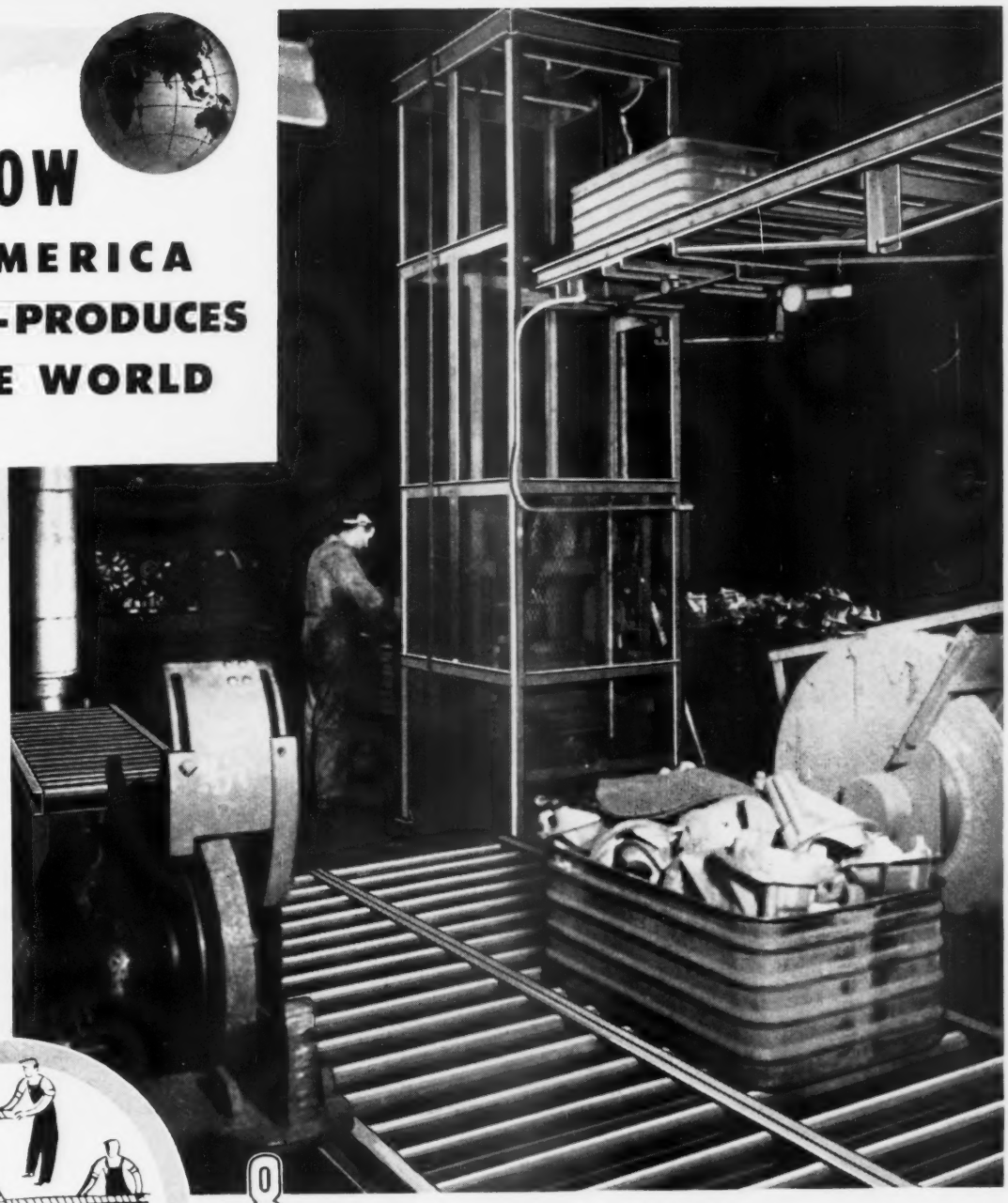
NEW stainless steel alloy for castings is said to combine high hardness, non-galling characteristics and superior corrosion resistance. Developed at Cooper Alloy Foundry Co., Hillside, N. J., the alloy contains 0.07 per cent C, 19.0 to 19.5 per cent Cr, 9.75 to 10.25 per cent Ni, 2.75 to 3.25 per cent Si, 2.0 to 2.25 per cent Cu, 3.0 to 3.50 per cent Mo, 0.50 to 0.75 per cent Mn, and 0.10 to 0.20 per cent Be. Properties are given as 302 Bhn as-cast, 269 Bhn quench annealed, and 363 Bhn annealed and hardened. Tensile strength is 151,000 psi, yield strength 122,400 psi, elongation 3 per cent , and reduction of area 2 per cent.

* * *

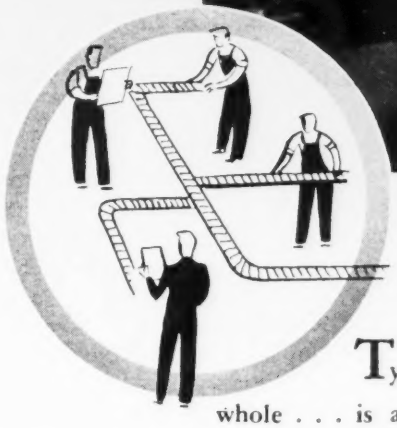
PROGRAM of research and development in basic instrumentation is now in its fourth year at the National Bureau of Standards. Under the general direction of W. A. Wildhack new applications of physical principles are being evaluated and applied to problems in measurement and control. Technical work of the Office of Basic Instrumentation has two principal objectives of systematic analysis of available methods and devices in terms of their performance and characteristics, and research on new applications of principles and materials leading to development of instruments and techniques not now available. Projects included in the technical program may be classified as: 1—Critical surveys of available instruments or techniques for certain types of measurement that are taking on increased importance. 2—Projects for the theoretical or experimental evaluation of new applications of physical principles to general problems in measurement and control. 3—Projects for new application of physical principles to specific problems, and 4—Projects for theoretical analysis and development in various fields of measurement, control or handling of measurement data.



HOW AMERICA OUT-PRODUCES THE WORLD



This Logan Vertical Reciprocating Conveyor lowers empty tote pans automatically from overhead Roller Conveyor feed line. Pans are returned from shipping department to chipping and grinding room. Part of complete system of Logan Conveyors in midwestern malleable foundry.



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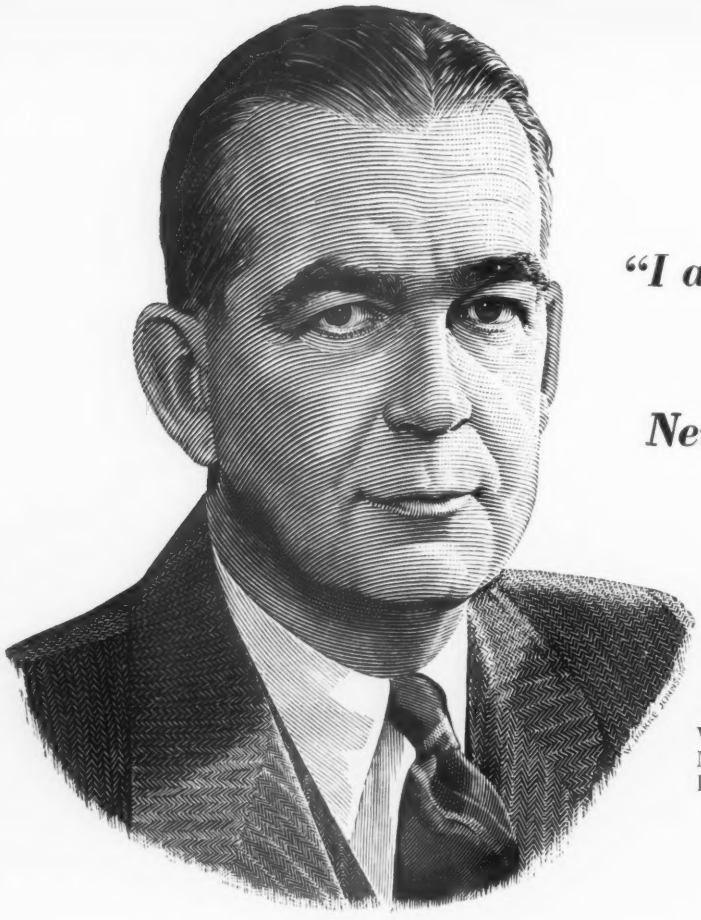

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FOUNDRY

OBITUARY

DORA OSTROFF, 41, president Thos. Paulson & Son Inc., brass founders, Brooklyn, N. Y., died of a cerebral hemorrhage in Paris, Sept. 20, while attending the International Foundry Congress. Miss Ostroff had been associated with the company for 23 years, and was general manager and superintendent until 3 years ago when she became president on the death of Thomas Paulson. She was the first woman secretary of Metropolitan Brass Founders' Association in New York, and belonged to other associations including the National Association of Purchasing Agents.

* * *

Richard W. Parsons, 50, since 1947 technical director, Ohio Brass Co., Mansfield, O., died Oct. 5. A grad-

RICHARD W. PARSONS

uate of Ohio State University, Mr. Parsons joined the company in 1927, became assistant metallurgist in 1929, plant metallurgist two years later and chief metallurgical engineer in 1942. He was a member of Northeastern Ohio Chapter of the AFS, American Society for Metals, American Society for Testing Materials and American Institute of Mining and Metallurgical Engineers. An article by Mr. Parsons, "Electric Annealing of White Iron" starts on page 113 of this issue.

* * *

Lucien W. Mueller, 58, industrialist, died on Oct. 6 after an eight-week illness. He was chairman of the board of the Mueller Co., Decatur, Ill., a valve manufacturing firm founded by his grandfather.

* * *

Henry Trenkamp Sr., 80, treasurer, Ohio Foundry Co., Cleveland, died Sept. 18. Mr. Trenkamp attended Canisius College, Buffalo and with his father was associated with Schneider-Trenkamp Stove Co. which acquired Ohio Foundry about 40 years ago. He had been treasurer since that time.

* * *

Ernest W. Shaw, vice president, the Freeman Supply Co., Toledo, O., died Aug. 18. Mr. Shaw joined the company in 1938 as Michigan area salesman, and became vice president in 1947.

* * *

John O. Larson, 39, executive vice president and director, Fischer & Porter Co., Hatboro, Pa., and director, Alloy Steel Casting Co., Willow Grove, Pa., died Sept. 18. A graduate of Illinois Institute of Technology, Mr. Larson had been in the instrumentation field since 1938.

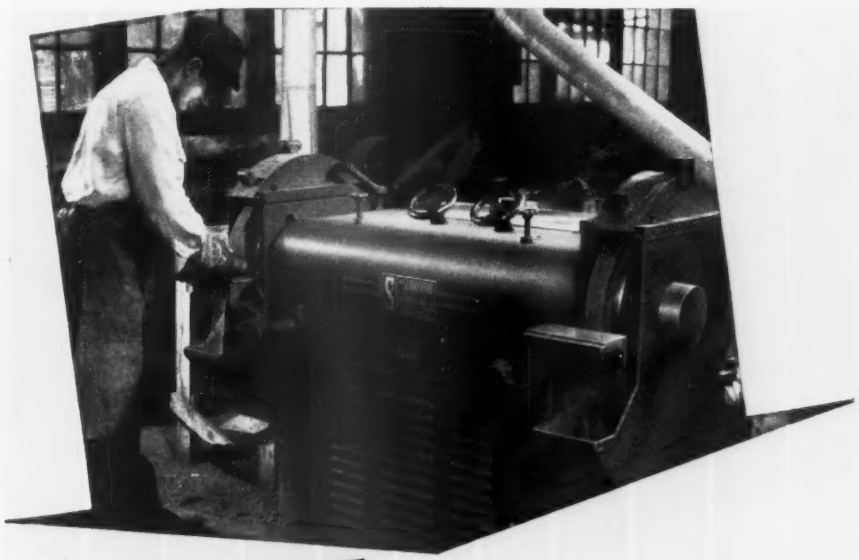
* * *

H. M. Stoneham, foundry superintendent, Kay-Brunner Steel Products Inc., Alhambra, Calif., died July 15. He had been with the company since 1925.

* * *

George Schreyer Jr., 68, for 25 years foundry superintendent, Lorton Reformatory, Washington, died Sept.

(*Concluded on page* 177)



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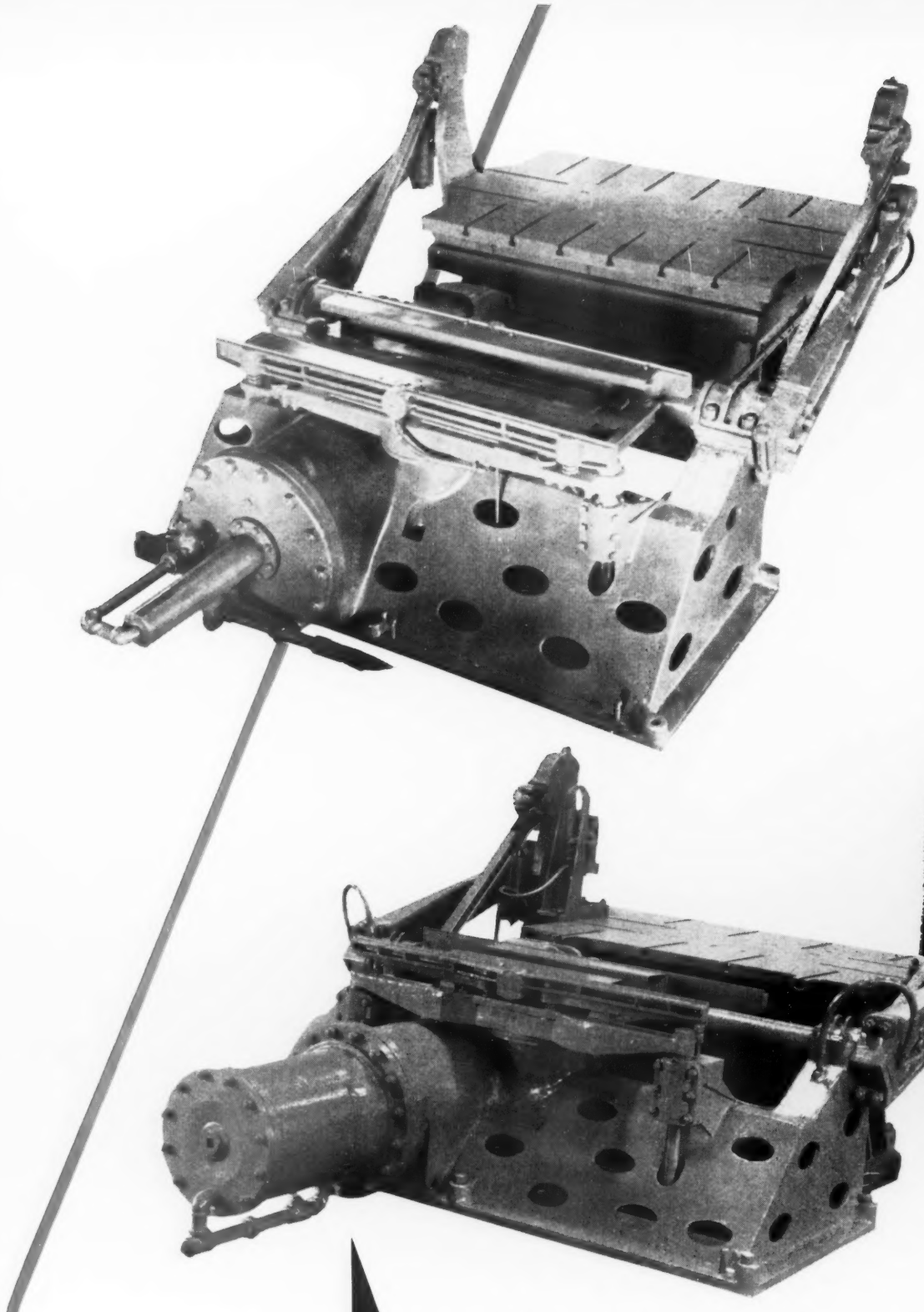

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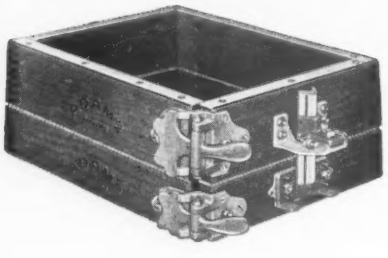

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MOLDING MACHINES and FLASK EQUIPMENT

DUBUQUE, IOWA, U.S.A.

(*Concluded from page* 173)

18. Mr. Schreyer learned the foundry trade at the U. S. Navy Yard, Washington. He retired from the reformatory foundry 4 years ago.

* * *

Mark B. Falvey, 63, president-general manager, Hoosier Iron Works, Kokomo, Ind., died Sept. 16. Mr. Falvey attended Notre Dame University and was associated with Byrne-Kingston Co. in Kokomo and Chicago from 1912 until 1923, when he returned to Kokomo and became manager of Kokomo Malleable Iron Works. He was named general manager of Hoosier Iron Works in 1928 and president in 1943.

* * *

Edward M. Boland, 69, founder and president, Central Brass & Aluminum Foundry Co., Cincinnati, died Sept. 4. A native of Cincinnati, Mr. Boland established the brass and aluminum company in 1922.

* * *

George P. Skinner, 70, sales manager for the former Milwaukee Steel Foundry Co., Milwaukee, and until his retirement 5 years ago, salesman for the Sivyer Steel Casting Co., there, died Sept. 7.

* * *

William M. K. Myers, 69, president, Penn Steel Castings Co., Chester, Pa., died Sept. 7. Mr. Myers was graduated from Pennsylvania State College and began his career as a draftsman for the Pennsylvania Steel Co.

* * *

Erik G. Grundstrom, 68, chairman of the board and factory manager, Advance Aluminum Castings Corp., Chicago, died Oct. 4 in that city.

* * *

George F. Applegate, secretary and sales manager, Ajax Electrothermic Corp., Trenton, N. J., died on Sunday, Sept. 27.

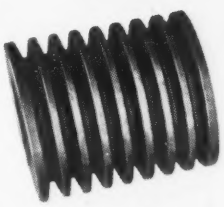
* * *

Fred Exton, 60, for the past 8 years plant manager, Cleveland Brass Mfg. Co., Cleveland, died Sept. 16.

Says Automatic Factory Is Still in Future

The completely automatic factory, manned only by a few technicians and a technical maintenance crew, is entirely feasible from the engineering viewpoint, but probably not economically practical at present, according to R. C. Sollenberger, executive vice president, Conveyor Equipment Manufacturers Association, when he spoke to the Society for Advancement of Management at Roosevelt Hotel, New York, on Sept. 17.

For superior castings at lower cost!



SHELL MOLDING IS THE ANSWER

Here is what Ted Saylor, president of Hillsdale Foundry Co., Hillsdale, Mich. says

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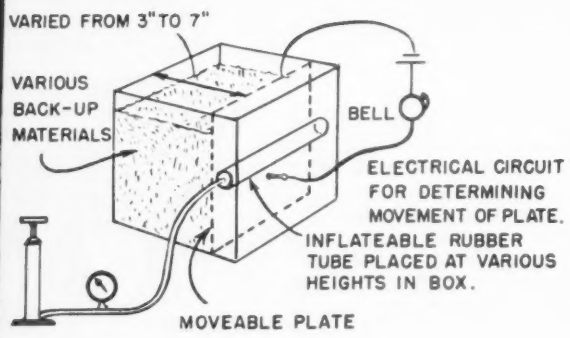
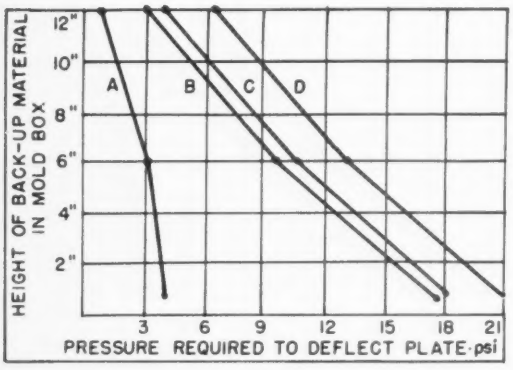

VARIED FROM 3" TO 7"
VARIOUS BACK-UP MATERIALS
BELL
ELECTRICAL CIRCUIT FOR DETERMINING MOVEMENT OF PLATE.
INFLATEABLE RUBBER TUBE PLACED AT VARIOUS HEIGHTS IN BOX.
MOVEABLE PLATE

Type of test box employed to measure the pressure exerted by various back-up materials.



Pressures exerted by various back-up materials in test box *A*—sand. *B*—shot 5/32-in. diam. *C*—shot 3/32-in. diam. *D*—shot that comprised a range of sizes

Back-up Material for
SHELL MOLDS

By WILLIAM O. FAXON
General Manager
Harrison Abrasive Division
Metals Disintegrating Co. Inc.
Elizabeth, N. J.

MOST people engaged in shell molding view the problem of back-up material as an evil to be avoided. Unfortunately, it is a necessary evil in many cases though not quite the bugaboo first imagined.

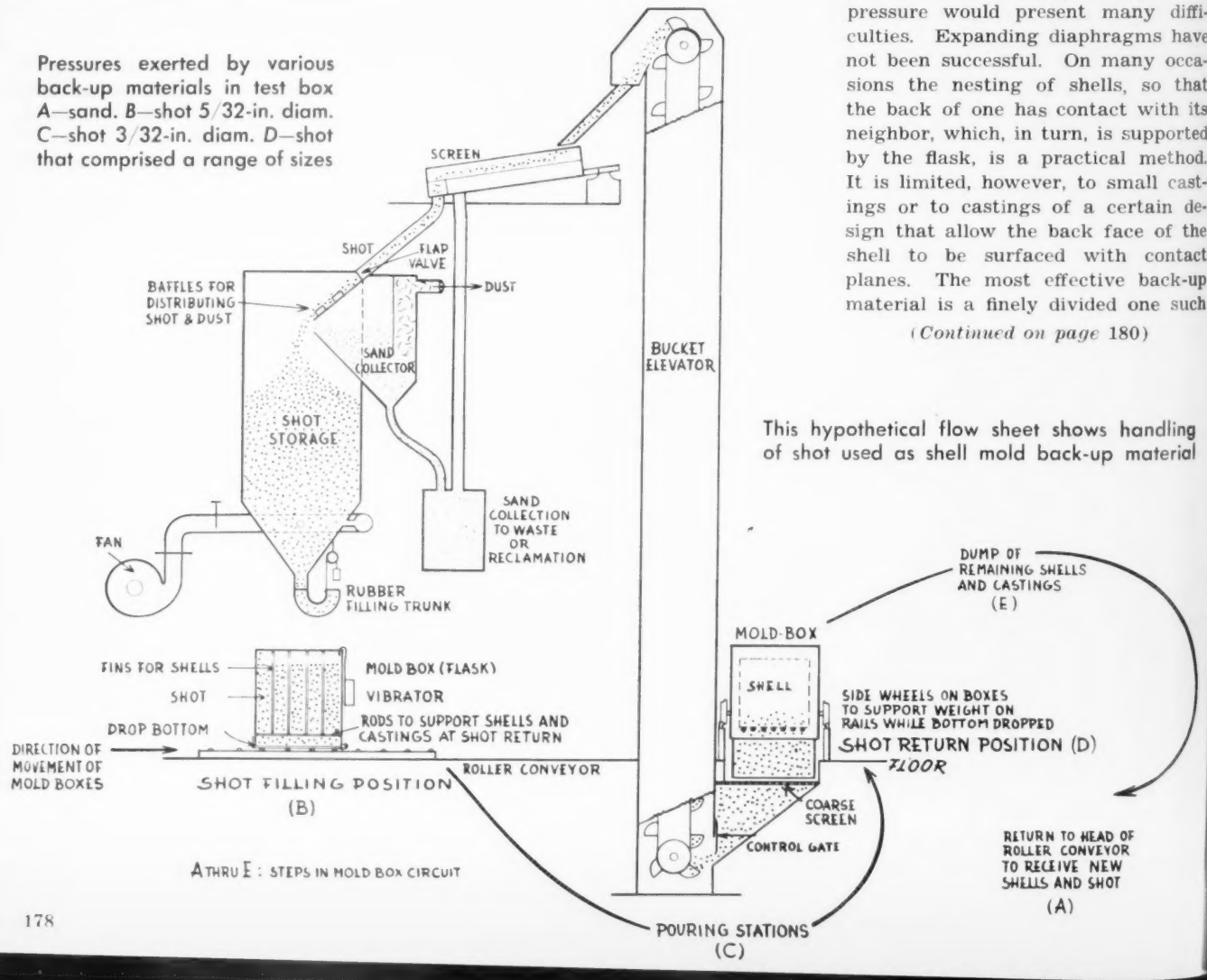
Shell molds are made in two halves which are then clamped together by various devices. In pouring molten metal into the mold the caster obviously wants to avoid not only rupture of the shell but any yielding that would result in a distorted casting. He is desirous of avoiding fins forming between the two halves. He wants a sound, strong shell perfectly mated.

One advantage of the shell molding process is the use of small quantities of sand compared with the normal sand mold. As binders have been developed, thinner shells have become practical. In addition to the shell having a resistance to distortion during pouring, it must also have sufficient porosity to allow the venting of gases. By its very nature the shell is not structurally a sound piece. In fact, the desire for thinness and porosity mitigate against obtaining structural strength. But if the shell can be backed up by another easily used and reclaimable material, then the first objectives for the shells can be more readily realized.

Attempts have been made to support the shell in various ways. Air pressure would present many difficulties. Expanding diaphragms have not been successful. On many occasions the nesting of shells, so that the back of one has contact with its neighbor, which, in turn, is supported by the flask, is a practical method. It is limited, however, to small castings or to castings of a certain design that allow the back face of the shell to be surfaced with contact planes. The most effective back-up material is a finely divided one such

(*Continued on page* 180)

This hypothetical flow sheet shows handling of shot used as shell mold back-up material



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(*Continued from page* 178)

as sand or gravel or metal abrasives. It exerts almost a uniform force on the shell.

As binders have improved, shells possessing sufficient strength without back-up have been successfully made for small and even medium-sized castings. However, as castings become larger, back-up material becomes necessary. In fact, its use can become a distinct advantage by allowing thinner shells to be used. In many instances the saving in resin costs will more than balance the costs involved in handling the back-up material.

In choosing a back-up material these points should be considered:

1. Does it exert sufficient pressure to avoid yielding of the shell?
2. Does it have porosity for escape of gases?
3. What effect, if any, will it have upon the casting?
4. Is it easy to handle?
5. Can it be reclaimed and reused?

Metal shot is commonly used in the foundry as an abrasive for blast cleaning, hence it was natural to turn to it as a back-up material. No other commonly available material has all of the attributes possessed by shot.

If balls of one size are placed in a container, the per cent of voids will be approximately 47 per cent. This is true regardless of the size chosen. By choosing balls of various sizes the per cent of voids is reduced, the small ones filling in the spaces between the big ones. The overall density of a container of balls is dependent upon the percentage of voids and the character of material of the balls. Iron shot itself has a specific gravity of about 7.2. Shot of roughly the same size will have a density of approximately 265 lb per cu ft. By a judicious choice of particle sizes the density can be raised to over 300 lb per cu ft (an apparent density of 5). The greater the density, the greater its resistance to deflection.

Another advantage in choosing a mixture of particle sizes is the reduction in flow of the mass. Balls of all one size will flow easily and less movement of each ball is required to allow overall movement because of the percentage of voids. The less the voids the more movement of the mass has to take place before deflection at one spot can occur.

Materials like shot unfortunately do not act like water and we cannot compute the horizontal pressures exerted by them in the same manner as we calculate hydrostatic pressures. Bridging and arching is likely to take place at various places in the mass. The theories of soil mechanics more logically apply. A study of various back-up materials was undertaken and, rather than depend purely on theory, a simple testing device was built.

The device consisted of a box similar to a mold. Inside one face a moveable plate was inserted which was, in turn, backed up by an inflatable rubber tube. Back-up mixtures were poured against the opposite side of the plate. The tube was first deflated and placed in a set position against the moveable plate (such as top, middle or bottom). An electrical contact was inserted through the side of the box just touching the plate. Air pressure was pumped into the tube and upon the first indication of movement of the plate, as observed by the breaking of the electrical contact, the pressure was recorded. Thus, the amount of pressure required to deflect various back-up materials at various depths in the mold box could be established. The action is similar to what actually would be experienced in pouring molten metal in a shell mold that was tending to spread apart.

For the purpose of testing, the box was made 12 in. deep. The distance between the plate and the other end of the box—the thickness of the back-up material—has a bearing on the problem. For most of the tests this was 7 in., but later was reduced. In general, the smaller the distance between the shell mold and the inside faces of the mold box the better, even though the test results showed a gain when the distance was reduced from 7 in. to 5 in.

(*Continued on page* 183)

SHELL MOLD SEMINAR: Foundrymen from Illinois, Indiana, Iowa, Minnesota, Missouri, Wisconsin and other areas participated in demonstrations and discussions with resin experts and shell mold machine manufacturers Sept. 17 as guests of the Argo, Ill., plant of Reichhold Chemicals Inc. R. J. Roach Jr., technical sales supervisor, Specialty Resins Midwest Division, started discussion with an analysis of shell mold economics. A Tyler Metal Products Co. shell machine was used in the demonstrations

Highest Production PER MAN HOUR of Any Core Production Unit!

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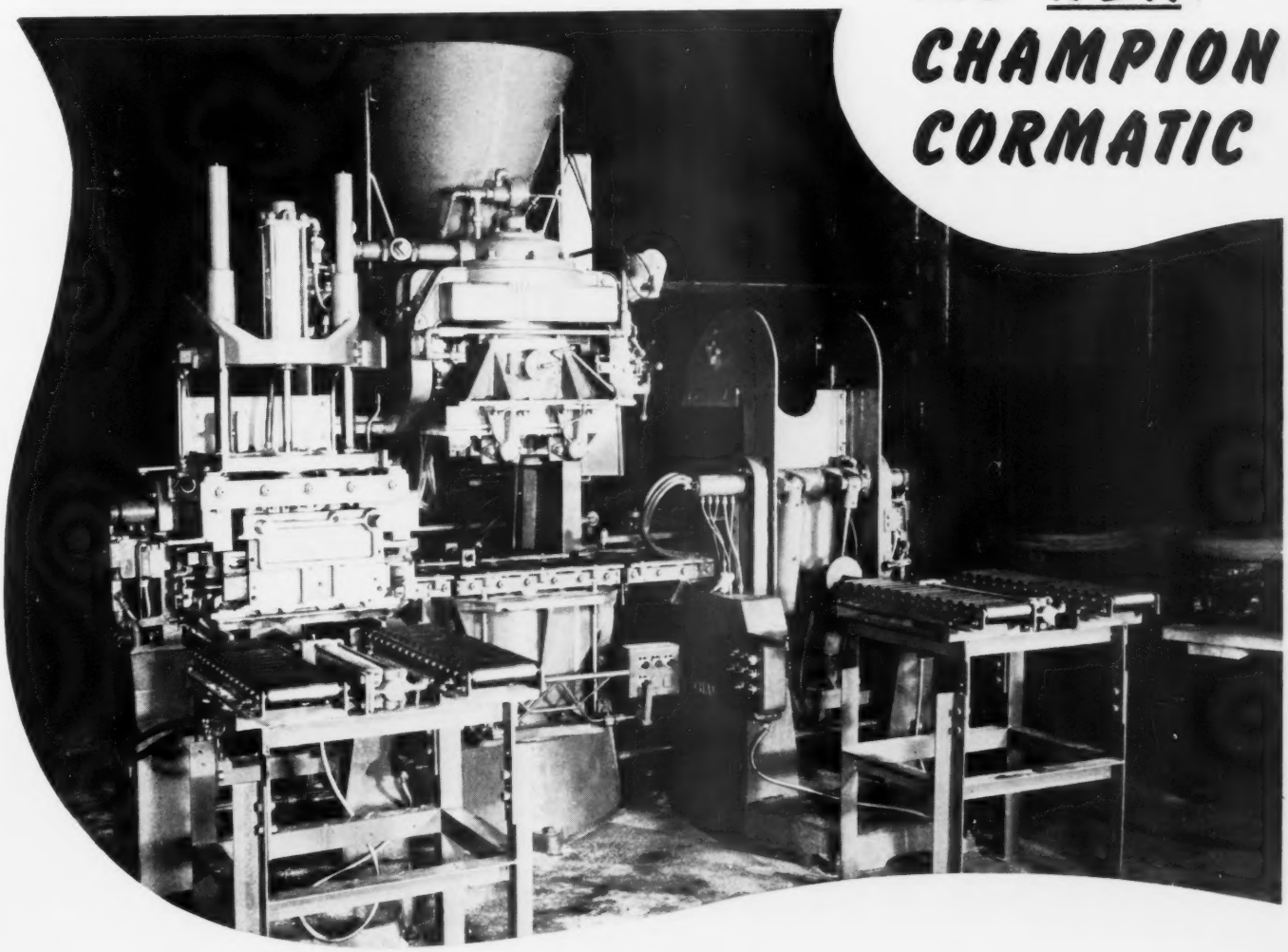

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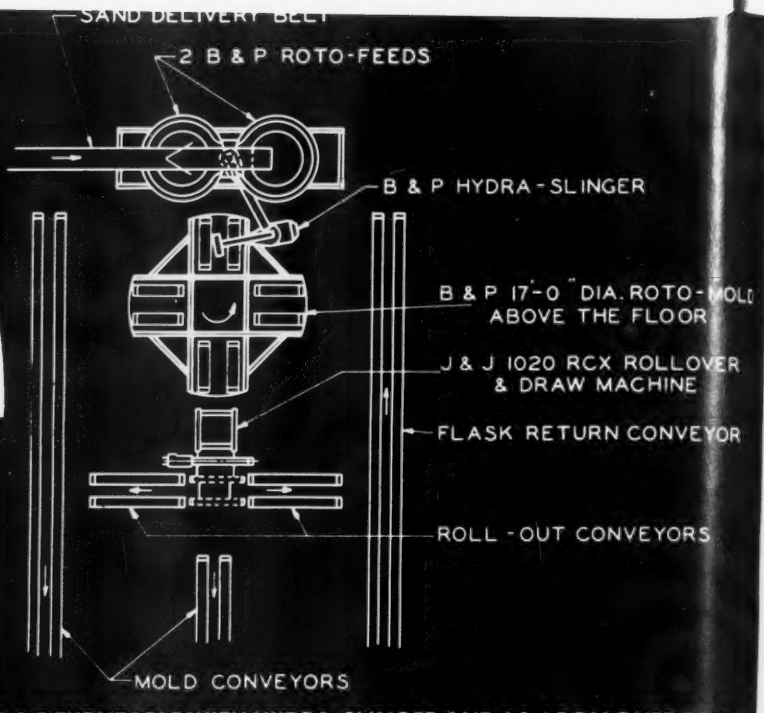
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2 B & P ROTO-FEEDS
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J & J 1020 RCX ROLLOVER & DRAW MACHINE
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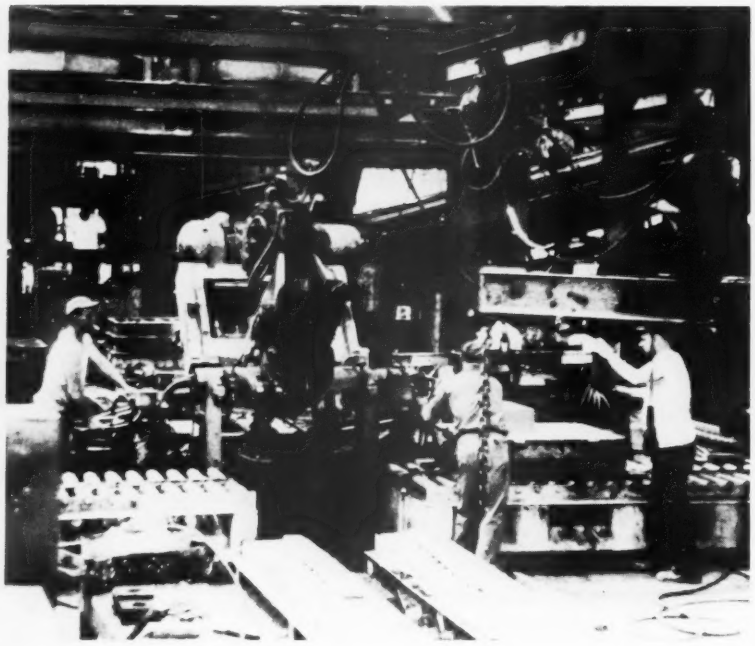
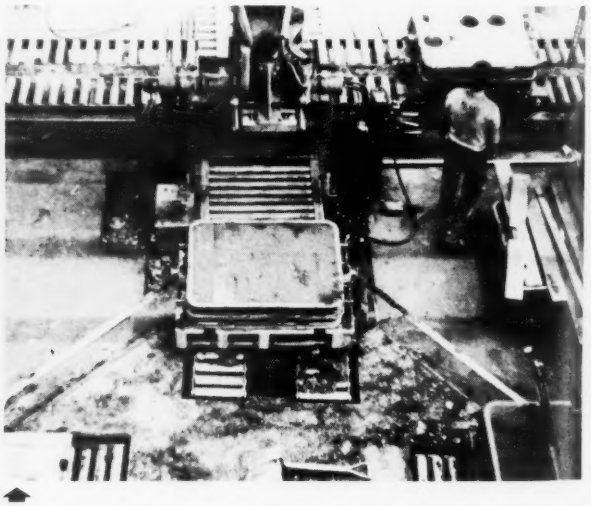
The exceptional molding flexibility required by the Riverside Foundry at Bettendorf, Iowa could only have been realized with a new B & P Above-Floor Turntable Hydra-Slinger molding unit. Riverside must produce molds of greatly varying size from a large number of different patterns each day. That's the exact job these new units are designed to accomplish. They are the answer to your molding problem where flexibility *and* production are important.

At Riverside, both wooden and metal patterns are handled with ease. Two B & P Roto-Feed plate feeders supply Speedmullor mulled facing and backing sand for the Hydra-Slinger. A new J & J 1020 RCX Rollover Draw machine handles all molds rammed on the unit. Like the Turntable itself, J & J Rollover Draw Machines require *no pits* for installation.

Most important, these new units are not only inexpensive to install, but also require less man-power than molding units offering comparable production. Riverside's full story is featured in "Better Methods." Write today for your copy, or to arrange for a demonstration at a nearby foundry.





The J & J 1020 RCX Rollover Draw Machine in action. Molds are rolled directly from the turntable, in the foreground, into the machine. Patterns are returned on the machine after the molds are drawn. No manual handling of molds or patterns.

A view of the new unit. The Hydra-Slinger operator, in the background, controls the slinger from his elevated platform, thus eliminating fatigue and permitting more uniform molding.

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(*Continued from page* 180)

and no further gain when reduced to 3 in.

Slanting the sides of the mold box did not increase the effectiveness of the back-up material. It is suggested that to keep the handling of the back-up material to a minimum, the mold box be sized to allow easy placement of the shell mold and yet leave a minimum volume to be filled with shot (say 3 in. between shell and sides of box).

A variety of types of back-up material was tested, the results of a few of them being plotted in the accompanying chart. The comparison between iron shot and sand is marked. The benefit of a range of sizes as against shot of the same size is verified by the test results. While a range of sizes is desirable, it introduces the question of segregation in the box or in handling. A range with the largest size particle being only two-thirds greater in diameter than the smallest will not cause segregation difficulties but will aid in increasing the density. A greater range should be avoided.

Vibrate Back-up Material

The lower limit of size of 3/32-in. was chosen arbitrarily, based upon the assumption that shot finer in size complicates the problem of separating the waste sand and shot when the mold box is dumped, and that the finer sizes run the risk of becoming imbedded in the hot shell.

The back-up material should be vibrated after filling. The effectiveness of the vibrated shot over loosely placed material amounts to as much as 175 per cent as established by test.

In the plot shown here, the figures of pressure are in accordance with the test results. Even though they must be accepted as relative only, it is clear that the pounds per square inch shown for shot far exceed the hydrostatic pressure of molten iron.

In choosing a back-up material one should be sure that the material possesses sufficient porosity to allow the escape of gases during the pouring operation. Metal shot sized to between 3/32 and 5/32-in. diameter will have voids of between 30 and 40 per cent. Graded sand is likely to have less. The greater the voids the easier the passage of the gases.

Considerable work has been done by others on the effect of back-up material on the macrostructure of various types of cast metals. These were compared with conventional green sand control castings. It was apparent that the shell molds had an insulating effect as compared with

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a more rapid rate of cooling upon solidification of the green sand castings.

It has also been established that there was comparatively little differential chilling between types of back-up material such as steel shot, steel grit, copper shot, etc. This was true even though there were large differences in thermo conductivity of the materials. With some types of materials there was evidence that the use of steel and copper shot resulted in a greater degree of internal soundness within the casting than for green sand or steel grit. In the early stages of shell molding it had been thought that the shot provided a chilling action. This has been pretty much disproved.

The next ratings of any back-up material are its ease of handling, its reclamation and reuse. Metal shot has advantages in this respect. It has definite flow. It can be easily handled in bins, bucket elevators, screw conveyors, belts, vibrators, etc. By choosing shot of roughly ⅛-in. diameter it can easily be separated from the sand of the shell since the largest particle of sand will be many times smaller than it.

Blow Air Through Shot

Several large foundries have established extensive material handling equipment for back-up material. However, the small foundry will find that simple devices can be used for recycling. One problem associated with any back-up material which is intended to be reused on a short cycle is the retention of heat absorbed during the pouring period. The extensiveness to which equipment is installed to solve this problem depends upon the volume and rapidity with which the material is to be reused. If on a short cycle, quench tanks followed by a drying operation may be necessary. In most instances, however, the metal shot temperature can be controlled by blowing air through the storage bin.

As more and more foundries become involved with the shell molding process and hence in turn the problem of handling the back-up material, many unique and ingenious practices have been evolved.

The flasks can be slotted so as to retain the edges of the shells and provide uniform spacing. Incidentally, the flask itself can be made of simple steel plate. The flask can be dumped by either a roll-over or by having a drop bottom. In the latter case, rods are sometimes inserted to hold the shells and castings in the flask while the back-up material flows out. The shells and castings are then dumped at another point.

Hose can be used like an elephant trunk for filling the flasks from an overhead bin. Either screens or magnetic pulleys can be used for separating the shot and the sand of the shell mold. In addition, air separation can be used to complete the separation of the two materials. The purely hypothetical flow sheet shown in the accompanying sketch incorporates many of the tricks of handling evolved by the users of back-up materials. It will be noted that all of the equipment involved is the type commonly used in all foundries.

Sand Moisture Control

(*Concluded from page* 123)

these are added automatically into the batch hopper through three devices known as Bond-Guides, one for each material. A Bond-Guide (Fig. 8) consists of a telescopic sleeve which can be adjusted to hold from 1 quart to 4 gallons of material. Air cylinders operate two valves, one for charging and one for discharging. Each unit is located directly below a hopper that contain a day's supply of material.

Hoppers for the guides are attached to the sides of the overhead main sand storage bin and the units are 18 ft above the top of the batch hopper. The metered amount of material flows from the guides into the batch hopper through 8-in.-diam pipes. The Time-Guide controls the Bond-Guides so that the latter discharge their contents just after the batch hopper has been filled with sand. The discharge pipes extend into the batch hopper just far enough that sand forms a seal around the pipes, thereby preventing a dust problem and at the same time saving bonding material.

The electronic probe mentioned earlier was developed to provide a high and low level indicator in sand hoppers at molding stations. Through these devices the system is given the call for sand or the indication that the need has been accommodated.

Operation of the system is through control provided by air cylinders. Fully automatic, no attendant is needed at the mixers or other locations. In the case of the slinger department, the slinger operator starts the sand system in the morning and turns it off at night.

Being fully automatic, the system is provided with numerous safety controls to prevent mishaps and damage to equipment. For example, if the batch hopper is not completely filled with sand, the timer will not start the cycle. If the water tank does not have in it the proper amount of water for the sand in the batch hopper, the timer will not start the cycle. Furthermore, the timer will not allow the mixer to stop while loaded unless for some emergency reason.

Except for details, the sand system for the squeezer and cope and drag department operates similarly to that for the slinger department. Each of the two mixers, shown in Fig. 5, has its own Hygro-Guide and timer, which are co-ordinated.

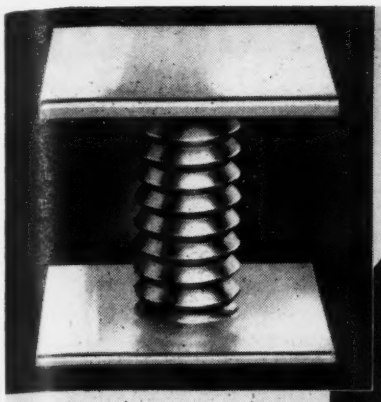
This type of control is adaptable to any foundry where the sand is prepared and handled in a mechanized system. Each installation, however, must be co-ordinated to meet the conditions of existing installation. A foundry can obtain whatever units of the system it needs or wants. For example, if a mixer already is equipped with a timer, this can be used in connection with the Hygro-Guide.

Experience of Neenah Foundry Co. with the automatic moisture control is that quality and finish of castings have improved because of the sand uniformity attained. This is reflected in lower cleaning costs and less scrapped castings. Fewer sand tests are taken because the system maintains sand uniformity.

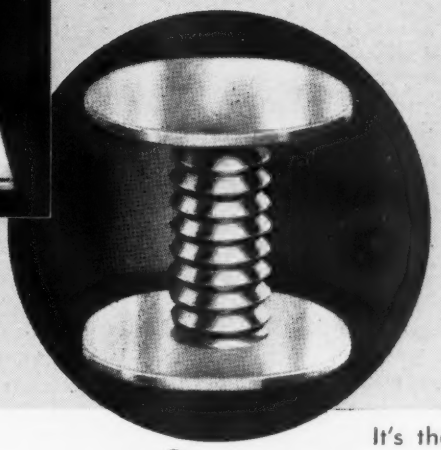
"The boss offered me a partnership today, but I'm holding out for a 2-cent raise."

GE Opens Magnet Plant

Carboloy Department of General Electric Co., Detroit, recently opened a magnet plant in Edmore, Mich., where latest innovations in transforming metal powders into solid metals and shaping molten metal by foundry operations will be used in production. Pushbutton controlled operations are spread over nearly 2 acres of floor space equipped with about 1½ miles of conveying systems. Plant will employ about 450 persons and produce 2200 types of magnets.



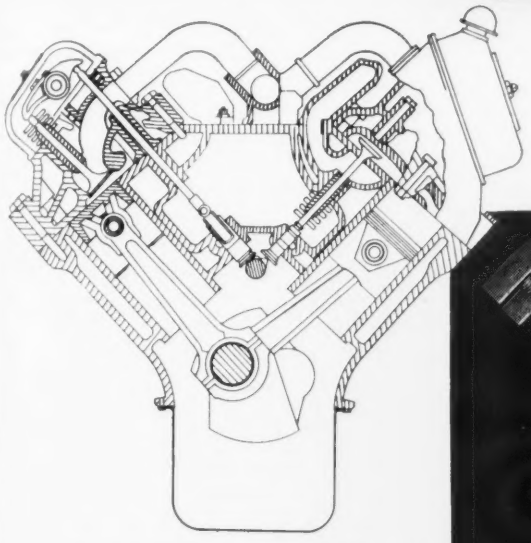
Double Head Thread Stem Chaplets for use on heavier castings. Available in heights for practically any section of metal. Stem diameters range from ⅛" to 1¼". Designs to meet all core and mold conditions.



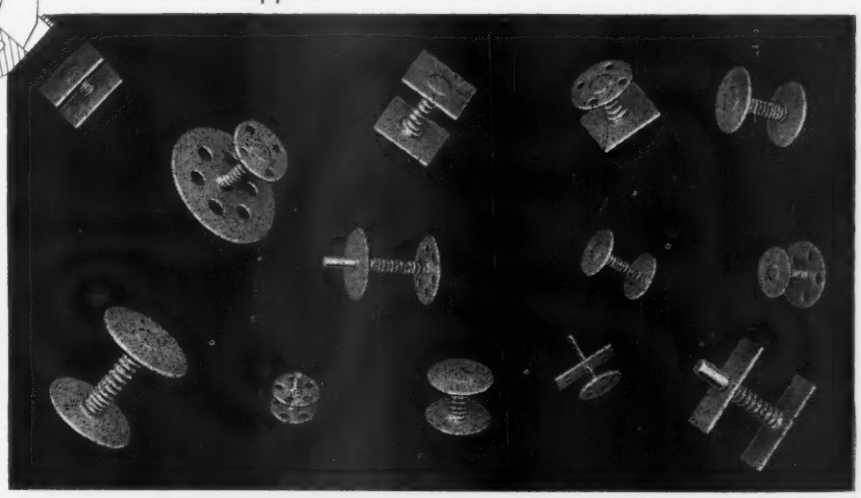
It's The Unusual Features of *Milwaukee* CHAPLETS

that insure Leak-Proof fusing and proper core support

It's the sharply cut "thread stem" design that insures leak proof fusing. Metal melts at the edges first, that's why the sharp edges "burn in" quickly and completely to insure instant fusing which results in freedom from leakers. Here is a design where fusion takes place at exactly the right speed to give you both instant fusion plus proper core support.



Cross Section of a standard "V" engine — a typical casting where proper "burning in" is imperative. Milwaukee Thread Stem Motor chaplets ARE doing an outstanding job on this kind of casting.



MILWAUKEE THREAD STEM MOTOR CHAPLETS

When light castings are subject to gas, steam, water, and other pressures, Milwaukee Thread Stem Motor Chaplets are specially recommended because they cut scrap losses due to leakers. Perforated heads allow trapped gases to escape . . . the lighter mass eliminates chill and because metal melts from edges, you have more edges resulting in a better opportunity for melting and complete fusing.

Add to this, uniform high quality, sturdiness of construction, an excellent protective coating and manufacturing to precision tolerances, and you soon discover why Milwaukee Chaplets are the favorite of the industry.

Motor Chaplets are available in round or square double heads from ⅜ " to 1" with the famous "thread" stem from 1/16" to ¼" in diameter.

If you have an unusual product or production problem where a specially designed chaplet or chill is required, we invite your engineering staff to consult with ours for the proper solution to your problem. **Milwaukee Chaplet & Mfg. Co., 1023 South 40th St., Milwaukee 15, Wis.**

MILWAUKEE CHAPLET

IMPROVEMENT IN STEEL CASTING QUALITY

Stressed at SFSA Annual Fall Meeting

By WILLIAM G. GUDE
Managing Editor

WHAT the Steel Founders' Society of America is doing to improve the quality of steel castings provided the major theme for discussion at the society's 51st fall meeting, held at the Homestead, Hot Springs, Va., Sept. 21-22. Attendance approximated the previous record for this annual gathering.

The opening session was devoted to reports of committees, with particular emphasis on how activities of these groups are enhancing product quality. A. J. McDonald, society president, and vice president, American Steel Foundries, Washington, in opening the session complimented members of the committees and the society's staff on their accomplishments. Referring to the general economy, Mr. McDonald pointed to signs of a downward trend in capital goods activity and the need for more aggressive selling and sound cost methods.

Shows New Motion Picture

Prior to the committee reports the society's new slide motion picture, "Steel Casting Design," was shown for the first time. This film is an excellent description of factors involved in the correct application of cast steel products in various industries. As explained by F. Kermit Donaldson, executive vice president of the society, the film, which was developed by the Advertising and Public Relations Committee, is planned to be shown before engineering students, design engineers and users of castings.

Work of the Product Development Committee is intended not only to expand the use of steel castings but also to stimulate the production of an improved quality product, it was stated by Ross L. Gilmore, chairman of the committee, and president, Superior Steel & Malleable Castings Co., Benton Harbor, Mich. A contest to be conducted by the committee for the best examples of new product applications has just been announced, and it is hoped to make this an annual event. Three prizes totaling $1750 are offered in each of two classes—one for steel foundry employees and the other for individuals outside the industry.

Mr. Gilmore said that new markets for steel castings continue to be developed through product development activities of individual foundries. Conversions from other forms of fabrication to steel castings last year were reported by 53 foundries to have totaled more than 48,000 tons.

During the last ten years the SFSA, at a cost of $460,000, has sponsored 42 research projects, of which 29 have been completed and 13 are in progress. All of the completed work has produced results which foundries have been able to apply with value to their practice, it was stated by H. D. Phillips, chairman, Technical Research Committee, and president, the Hartford Electric Steel Corp. of Hartford, Conn. Mr. Phillips urged that more extensive application be made of the findings of these investigations, which he described as valuable tools in improving casting quality.

A. J. McDONALD
President
Steel Founders' Society of America

Main function of the society's Technical and Operating Committee is to improve quality of steel castings through study of operating practice, and not merely to maintain existing quality. In reporting on activities of the committee, its chairman, R. C. Wood, vice president and works manager, Minneapolis Electric Steel Castings Co., Minneapolis, pointed out that the exchange of technical information through district and national T. and O. meetings is infinitely more productive of benefits to their participants than would be separate studies of the subjects by individual foundries.

Mr. Wood said that the topic of quality improvement will feature a number of papers to be presented at the first session of the national T. and O. conference to be held at the Carter Hotel, Cleveland, Nov. 4-6.

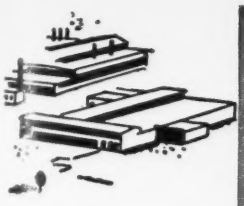
In opening the second day's session, President McDonald stressed the need for short-term volunteer service by foundry executives at Washington. The newly established Business and Defense Services Administration, which will continue the residual defense and mobilization functions of the former National Production Authority, sets up 25 industry divisions staffed by business experts from government and private industry. After considerable effort the ferrous foundry industry has succeeded in being represented under the Iron and Steel Division by a separate branch. As pointed out by Mr. McDonald, it is now up to the foundries to see that this branch is adequately staffed by industry men.

Research Pays Off

A review of the over-all program of the Steel Founders' Society the last five years was presented by C. L. Harrell, chairman, Program Appraisal Committee and vice president secretary-treasurer, Sterling Steel Casting Co., East St. Louis, Ill. H traced the development of research product development and technica and operating activities, and pointe out that research work has been the principal contributor to the marke increase in the society's budget i recent years.

Under the title "Economic Educa tion of Employees in a Small Foundry," Robert A. Palik, Keoku Steel Casting Co., Keokuk, Iow gave a condensed but most interest ing version of a discussion cours conducted by his company for it employees. It is intended to explai by simple examples how our fre enterprise system operates and ho it has raised living standards. Addi tional aims are: To demonstrate the influence of competition in improv ing plant efficiency and lowering prices; to compare the individua freedoms enjoyed here with thos in other countries; and to give de tailed information on the company' finances, management and opera

(Concluded on page 188)



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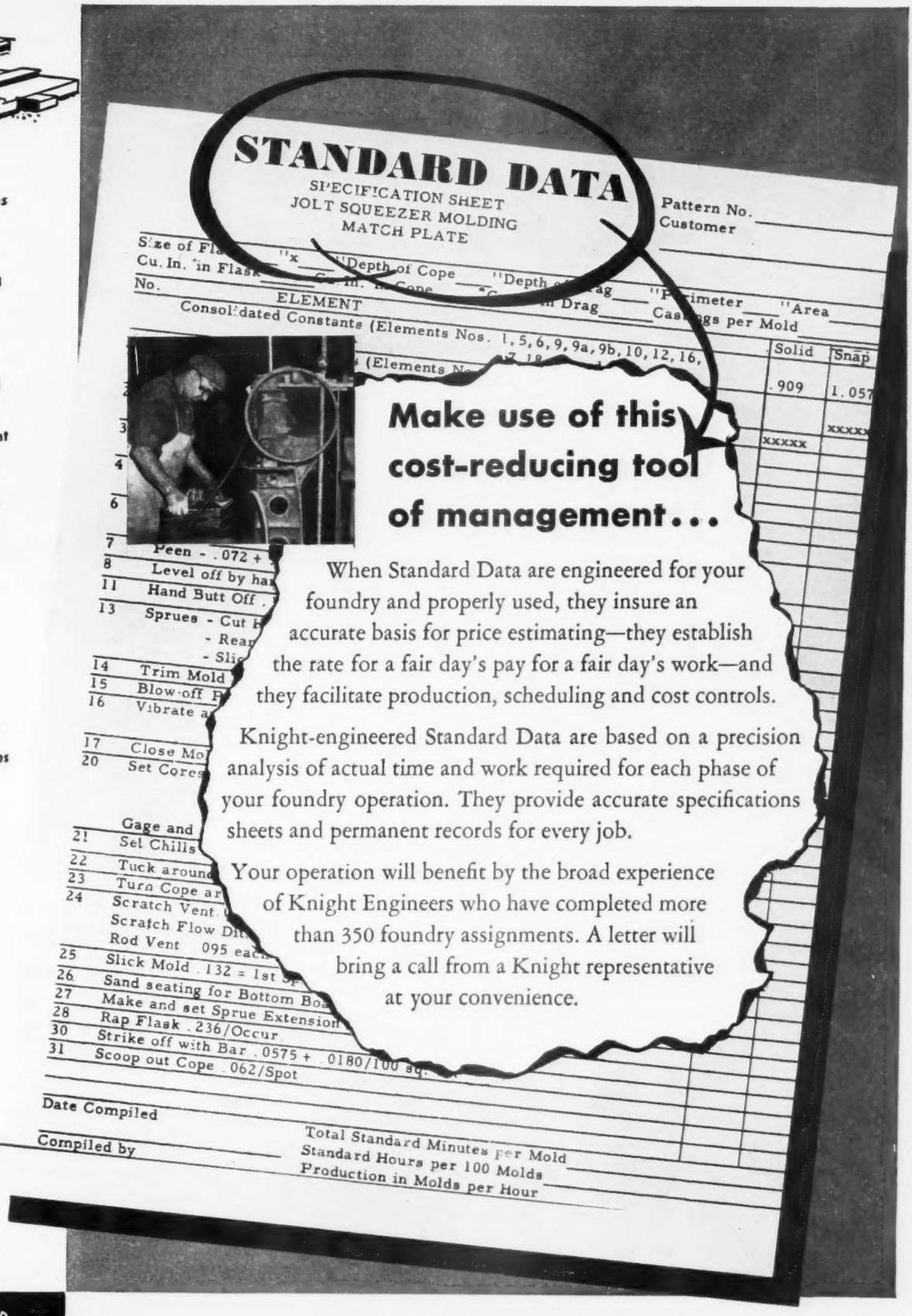

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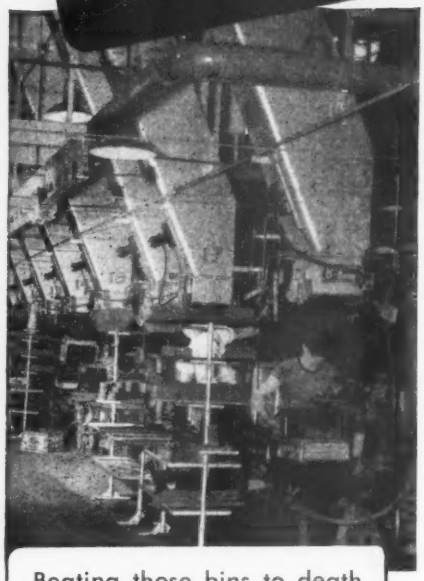
BIN STUCK LATELY?



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(*Concluded from page* 186)

tions.

The foundry industry has a long way to go in improving its safety record, it was indicated in a critical appraisal of the subject by E. M. Layman, chairman, Safety Committee of the society, and director of personnel, General Steel Castings Corp., Granite City, Ill. Improvement can come only through a well formulated, management - sponsored program, particularly in the smaller plants, where most accidents occur, he said.

The society's committee is developing specific programs for different size plants and is co-operating with the American Foundrymen's Society in the latter's safety activities. The SFSA annual safety contest, ended Aug. 31, had 140 entries and the records of 49 plants rated awards. This compares with 37 winners a year ago.

Department Wants Co-operation

Stephen F. Dunn, general counsel, U. S. Department of Commerce, spoke at the luncheon concluding the meeting. He said that the department has no intention of duplicating or infringing upon the activities of trade associations or other business groups, but does actively solicit their assistance and support. The administration intends to make Commerce the effective spokesman for business within government and is rejuvenating many activities which were relatively dormant the last 20 years, he added. For example, the speaker pointed out that for some time the Department of Labor was the sole spokesman for the administration on laws and other policy matters affecting management and the public just as vitally as labor, while Commerce seldom spoke up for the businessman's interest. Commerce hopes, by working more closely with the Department of Labor, to bring about greater understanding between labor and management.

At the same time, Mr. Dunn said, the department is simplifying, instead of adding to, its activities; it has reduced its budget, is disposing of or transferring some of its former functions and is attempting to eliminate all duplication of activities while making its primary efforts more effective. In conclusion, he urged businessmen to become better acquainted with the nation's problems and needs and to develop the degree of civic responsibility that results in genuine business statesmanship.

Foundries presented safety awards for the best records in the 1953 contest were as follows:

Plaque Winners—

Group 1—1000 to 25,000 man-hours exposure: Malleable Iron Fittings Co., Branford, Conn.; Quincy Steel Casting Co. Inc., North Quincy, Mass.; Weatherly Steel Castings Co., Weatherly, Pa.; Tonawanda Electric Steel Casting Corp., North Tonawanda, N. Y.; Alloy Cast Steel Co., Marion, O.; Calumet Steel Castings Corp., Hammond, Ind.; Grede Foundries Inc., South Water Division, Milwaukee; Locomotive Finished Materials Co., St. Joseph, Mo.; Washington Iron Works, Seattle; Utility Steel Foundry, Vernon, Calif.; Pacific Steel Casting Co., Berkeley, Calif.

Group 2—26,000 to 45,000 man-hours exposure: Hartford Electric Steel Corp., Hartford, Conn.; Texas Steel Co., Ft. Worth, Tex.; American Cast Iron Pipe Co., Birmingham; Mountain State Steel Foundries Inc., Parkersburg, W. Va.; National Supply Co., Torrance, Calif.; Westlectric Castings Inc., Los Angeles; Hanford Foundry Co., San Bernardino, Calif.

Group 3—46,000 to 85,000 man-hours exposure: Ross-Meehan Foundries, Chattanooga, Tenn.; Oklahoma Steel Castings Co., Tulsa, Okla.; Mackintosh-Hemphill Co., Midland, Pa.

Group 4—86,000 and up man-hours exposure: Crucible Steel Co. of America, Harrison, N. J.; United States Steel Corp., Johnstown, Pa.; American Steel Foundries, East St. Louis Works, East St. Louis, Ill.

Certificate Winners—

Continental Foundry & Machine Co., Chicago Works, East Chicago, Ind., frequency rate 2.2; General Steel Castings Corp., Granite City, Ill., 2.4; United Engineering & Foundry Co., Vandergrift, Pa., 3.1; Penn Steel Castings Co., Chester, Pa., 4.4; Wehr Steel Co., Milwaukee, 5.0; Symington-Gould Corp., Depew, N. Y., 6.1; Texas Electric Steel Casting Co., Houston, Tex., 6.1; Duriron Co. Inc., Dayton, O., 6.5; Mid-Continent Steel Casting Corp., Shreveport, La., 6.6; National Malleable & Steel Castings Co., Sharon, Pa., 6.8; Continental Foundry & Machine Co., Wheeling Works, Wheeling, W. Va., 6.9; Dominion Foundries & Steel Ltd., Hamilton, Ont., Canada, 7.0.

General Steel Castings Corp., Eddystone, Pa., 7.4; American Steel Foundries, Indiana Harbor Works, East Chicago, Ind., 7.5; Unitcast Corp., plant No. 1, Toledo, O., 7.8; Dodge Steel Co., Philadelphia, 8.1; Farrell-Cheek Steel Co., Sandusky, O., 8.3; Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa., 8.4; Continental Foundry & Machine Co., Pittsburgh Works, Coraopolis, Pa., 8.5; Atlantic Steel Castings Co., Chester, Pa., 8.5; American Hoist & Derrick Co., St. Paul, Minn., 8.9; Fort Pitt Steel Casting Division, Pittsburgh Steel Foundry Corp., McKeesport, Pa., 9.0; Sterling Steel Casting Co., Monsanto, Ill., 9.0; Falk Corp., Milwaukee, 9.3; Alloy Steel & Metals Co., Los Angeles, 9.3.

Swiss Firm Celebrates Its 150th Anniversary

Celebrating its 150-year jubilee last year, George Fischer Ltd., Schaffhausen, Switzerland, issued a series of publications to honor the occasion. One of these, "An Outline of the Development of the George Fischer Works," provides a vivid picture of the origin, development and present condition of the world-famous Swiss firm.

Printed in English, the slender volume and its many illustrations offer an insight into the highly diversified nature of the company's activities, which include the production of a great variety of malleable iron, gray iron and steel castings for use as fittings and wheels and in machinery.

The book traces the history of the firm, explains its place in the Swiss economy and its contributions to the nation's welfare, and discusses labor relations and benefits.

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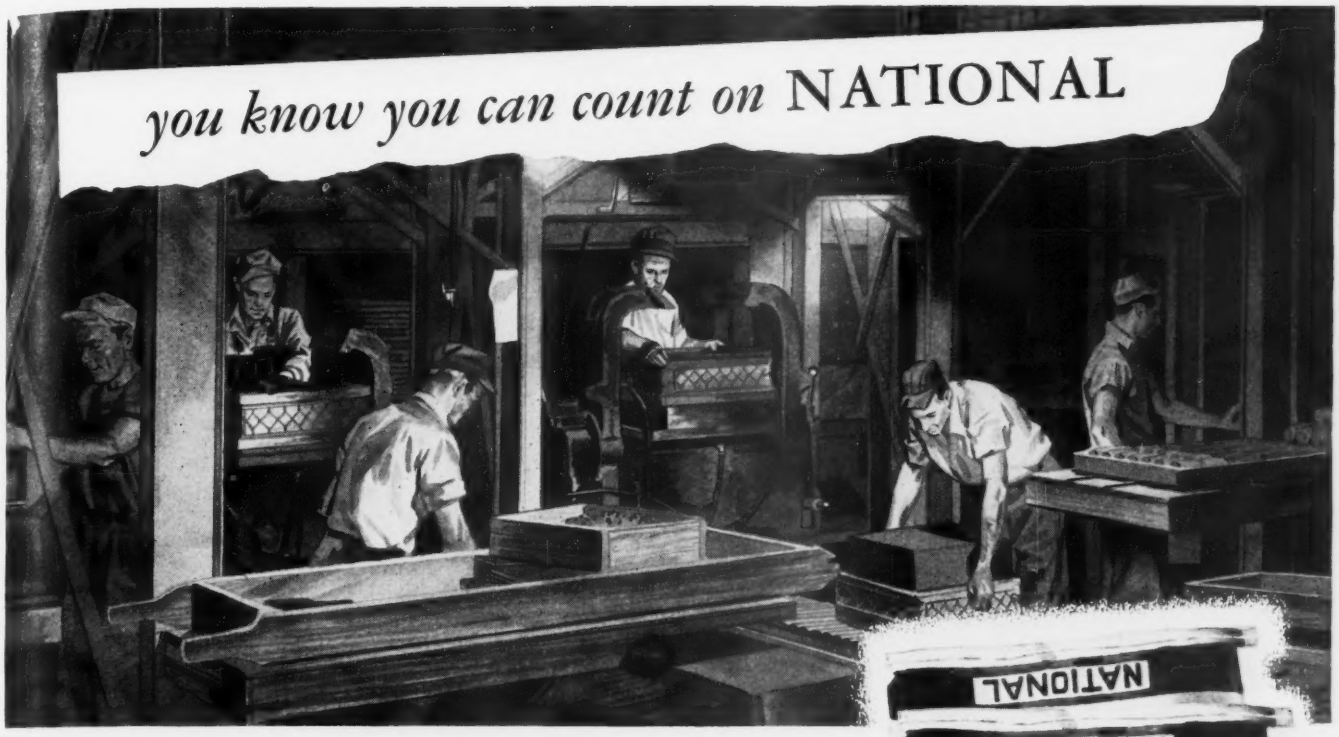

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You, too, can be sure of better bonds with NATIONAL BENTONITE.

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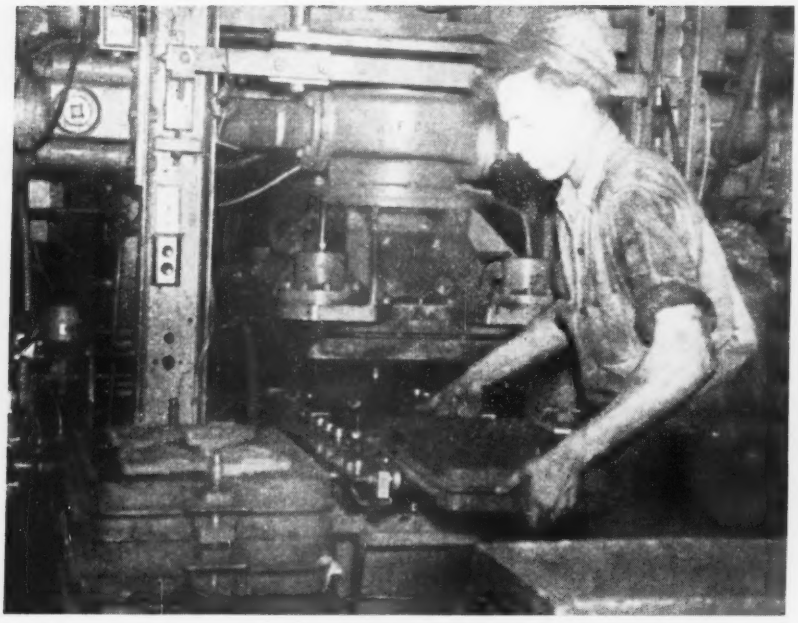
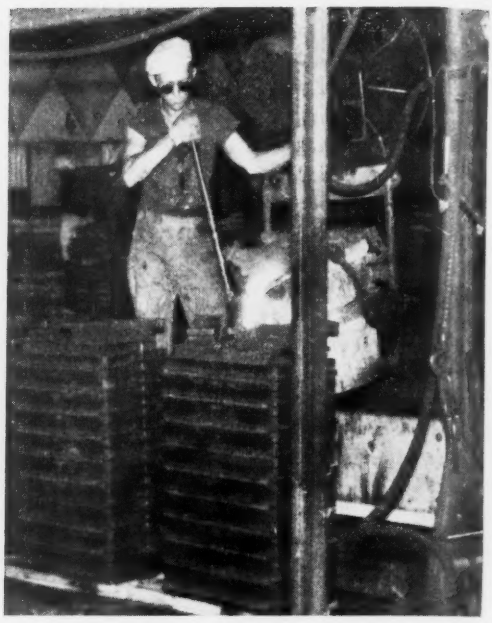


Operator lifts completed mold section from machine. It will be placed over previous section containing cores in stack at left



Stacks are poured on roller conveyor. Shakeout device is shown at the right

Mold Blower Provides High Production Rate

By ROBERT H. HERRMANN
Associate Editor

AT John Deere Malleable Works, East Moline, Ill., one operator on a new type of blow-squeeze machine is turning out 750 mold sections every 8 hours. This is a stack molding operation and the steel flasks measure 3 x 12 x 20 in. Each flask takes a little less than 30 lb of sand. Consequently, the machine consumes about 11 tons of sand during the 8-hour run.

Molding sand mix is the same as is used in the over-all foundry operation and is basically a four-screen (50, 70, 100, 140) synthetic sand. Additions are 4 per cent seacoal and wood flour combined, 4 per cent western bentonite, 1 per cent southern bentonite and 3 to 4 per cent moisture. This formulation produces a sand with 90-110 permeability, green compression strength of 9 psi at 3.5 per cent moisture and a mold hardness of about 70.

Sand is fed to the machine by overhead belt and plowed off into a vibrated supply hopper. A constantly vibrated sloping pan under the hopper feeds sand to the vibrated machine hopper which feeds the 30-lb capacity blow magazine.

Machine operates at 90 psi air pressure. The 1¼-in. aluminum blowplate contains 22 one-inch-diameter steel blowholes roughened slightly on the inside near the surface of the plate so that the sand will break off flush with the top of the mold. The top plate also has ten 1-inch-diameter slotted brass air vents. Thirty-four vents in the bottom plate are the same size and type, plus two ½-inch-diameter slotted brass vents. This plate contains the four drag pattern sections.

A 1¼ to 1 in. tapered sprue former is mounted in the top plate and has a spring-loaded plug which presses against a rubber pad in the bottom plate to make a tight seal, preventing formation of sand fins around the sprue hole.

The bottom plate, which forms the cope mold cavity, is ⅝-in. steel with four aluminum patterns mounted on it. Guide pins stick up from the ends of the plate, and, when the machine closes for the blow, the pins fit into aligning holes in the flask. Directly above these holes is another set of pins on the flask which fit into guide holes in the 2-in. steel squeeze plate. The squeeze plate is located around the blowplate, and a ⅜-in. squeeze is accomplished hydraulically.

Each flask is fed in and out of the machine on a roller wheel conveyor extending from under the blowhead beyond the front of the machine. Horizontal rollers along the conveyor contact the sides of the flask and help to guide it over the bottom plate. Steel runners, protruding from the flask sides, ride on the conveyor wheels. Flask is placed on the conveyor and pushed under the blowhead manually. A micro safety switch, actuated by the flask when it is positioned properly, closes a circuit; this permits the machine to run through its cycle when the start button is pressed. A spring-loaded catch holds the flask in position.

The various operations of the machine are controlled by an electric cam timer which is set to make a complete cycle in 8.2 seconds. When the start button is pressed, a shuttle board at top of the machine slides into place over the blow magazine, and a circular rubber disk in the shuttle forms an airtight seal against the magazine. The machine is closed pneumatically, with the lower plate being raised to engage the flask on a ⅛ x ½-in. rectangular steel wear strip and lift it off the rollers. The blowplate and squeezer plate descend, and a similar wear strip on the squeezer plate contacts the upper edge of the flask. The squeezer plate is held in position hydraulically.

Compressed air from storage tanks on each side of the machine enters the blowhead through two 4-inch-diameter rubber hoses mounted at opposite sides of the head, and the mold is blown. Air is exhausted through seven 1-inch-diameter screened, valve-controlled vents in the

(*Concluded on page* 192)

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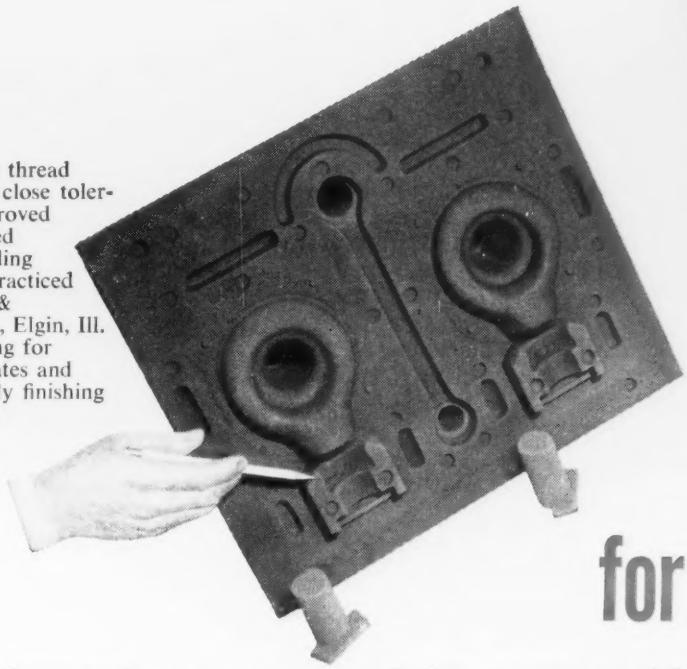
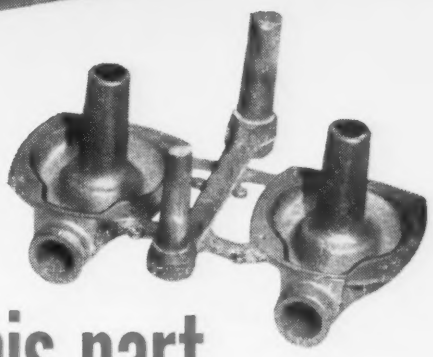


Cast-in screw thread demonstrates close tolerance and improved finish produced by shell molding technique as practiced by Woodruff & Edwards, Inc., Elgin, Ill. Minor grinding for removal of gates and runners is only finishing step required.



for this part...

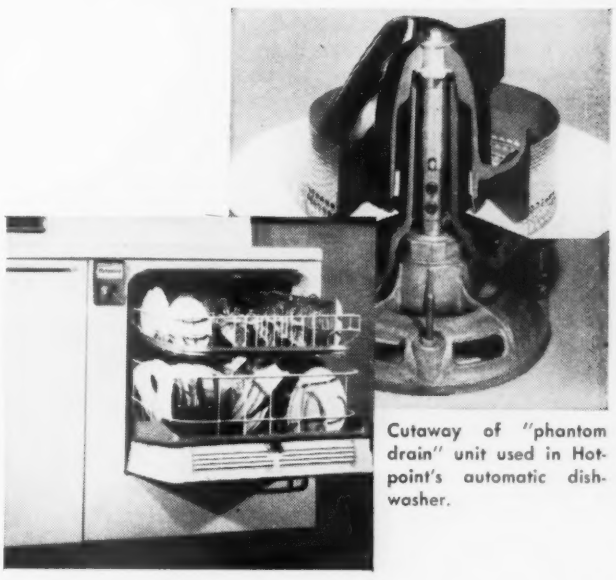
cast to close tolerances at much lower cost with Resinox-bonded shell molds

Shell molding helps industries producing for the mass markets to take advantage of new production efficiencies that result in:

- **lower end-unit cost**
- **greater flexibility of product design**
- **higher quality**
- **quicker adjustment to the needs of the market**

For example, Hotpoint's new automatic dishwasher with its "Phantom Drain" unit. By shell-mold casting of gray iron parts, Woodruff & Edwards, Inc., who supply this part to the Hotpoint Co., sliced unit production costs nearly in half by a 100% elimination of machining costs. Threads are cast to exact specifications and close tolerances are held throughout the finshed part. Improved design was another gain, since the smoother cast surface offers less resistance to the flow of water when the dishwasher is in use.

Monsanto will be glad to tell you more about the cost-saving advantages of new foundry techniques made possible through research in industrial resins. In addition to resins for shell molding, Monsanto also supplies phenolic and urea core binders, and Lytron-886 sand conditioner. For further information on these new products and processes, fill in and mail the handy coupon below. Resinox, Lytron: Reg. U. S. Pat. Off.



Cutaway of "phantom drain" unit used in Hotpoint's automatic dishwasher.

MONSANTO

SERVING INDUSTRY... WHICH SERVES MANKIND

MONSANTO CHEMICAL COMPANY
Plastics Division, Room 5717, Springfield 2, Mass.

☐ Please send me your free booklet, "The Shell Molding Process."
I would like information on: ☐ Monsanto resins for shell molding, ☐ Monsanto resins for core binding, ☐ Lytron sand conditioner.

Name & Title _____

Company _____

Address _____

City, Zone, State _____

(*Concluded from page* 190)

rubber disk on the shuttle and through valve-controlled vents on two sides of the magazine.

Then the mold is squeezed by letting out fluid from the hydraulic cylinders holding the squeeze plate in position, permitting the upper pattern plate to lower an additional ⅜-in. pneumatically. Upon completion of the squeeze, the upper and lower plates are vibrated and drawn pneumatically back to starting position, the completed mold section being deposited on the roller conveyor as the lower plate drops down. The shuttle moves over to permit sand to fall into the magazine ready for the next blow. Air then is fed to a cylinder which releases the spring-loaded catch holding the flask in place. As the catch arm moves away from the flask it closes a solenoid which actuates an air ram to push the flask out of the machine onto the roller conveyor. In rolling out of the machine, the flask closes a switch near the front end of the conveyor to open a valve permitting air to enter the other end of the cylinder and retract the ram.

The steel wear strips on the bottom plate and squeezer head also serve as bushings around the flask edges, permitting the sand to extend above and below flask edges to form a sand-to-sand seal when the mold sections are stacked. Mold stacks are assembled on wooden bottom boards on a gravity roller conveyor to one side of the machine. When completed, they are pushed out to the pouring area for the next operation.

All mold sections in the stack are identical. Sprue hole in the bottom section is plugged with a baked sand core. Four cores are placed on each section except the top one. Subsequent sections are placed one on top of the other, proper alignment being accomplished by the guide pins and holes discussed previously. A funnel-shaped, baked core pouring basin is placed in the sprue hole of the top section. Assembled stacks consist of ten mold sections, producing nine molds of four cavities each.

Changing patterns on the machine involves the removal of two bolts on the bottom plate, four bolts in the squeezer plate and eight in the blow-plate. Closing the main air valve and opening a smaller valve permits manual machine operation during pattern change. Proper pattern alignment is obtained by adjustments in the bottom plate, which has bolt holes of sufficient size to permit shifting.

The machine, available for various size flasks, is made by Wm. Demmler & Bros., Kewanee, Ill.

Texas Foundry Boosts United Fund Campaign

For the third straight year, the 295 employees of Texas Electric Steel Castings Co., Houston, Tex., is the first group in Houston to report 100 per cent participation in the local United Fund Campaign. Their contribution of $2952.95 to the 1953 fund was made several weeks before the start of the drive. Contributions averaged $10.01 per employee.

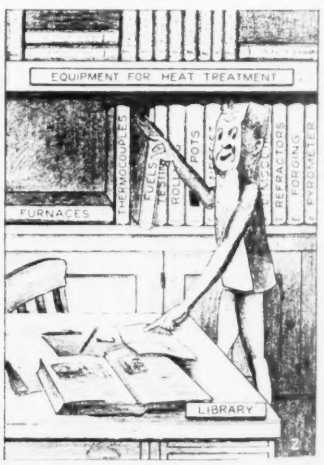
The early donation was made possible by the "TESCO Contributory Fund," maintained by employees on a year-round basis. Each employee voluntarily authorizes a $1-per-month deduction from his pay for the fund, which handles all requests for charitable causes and also takes care of distress cases among TESCO employees.

Review of Research Is Reprinted by ASTM

The "Review of ASTM Research," published in the December, 1952, and January and February, 1953, *ASTM Bulletins,* has been reprinted by the society and is available without charge. This material, prepared by the ASTM Administrative Committee on Research, summarizes the work of the various society technical committees as of May, 1953. Copies are available from ASTM headquarters, 1916 Race St., Philadelphia 3.

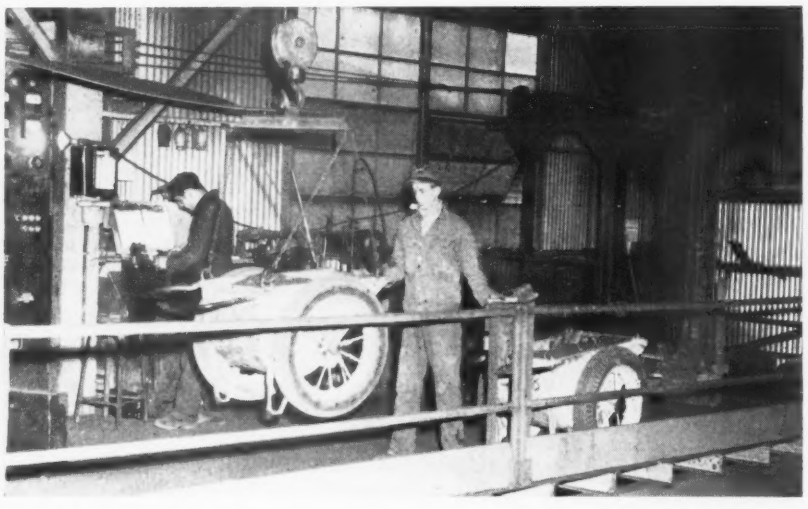
Book Review

Elements of Heat Treatment, by George M. Enos and William E. Fontaine, cloth, 286 pages, 5¾ x 9 in. Published by John Wiley & Sons Inc., New York. Price $5.



Based on notes used in the first course in metal processing given to freshman engineering students at Purdue university, this book in simple language discusses the basic fundamentals of heat treatment so that they are understandable to those not specifically trained in metallurgy.

Contains chapters on nature of metals and alloys, mechanical properties of metals, steel, mechanical working, annealing and normalizing, hardening by quenching, tempering, hardenability, alloy steels, surface hardening, cast irons and their heat treatment, heat treatment of nonferrous materials, and equipment and methods used in heat treatment.

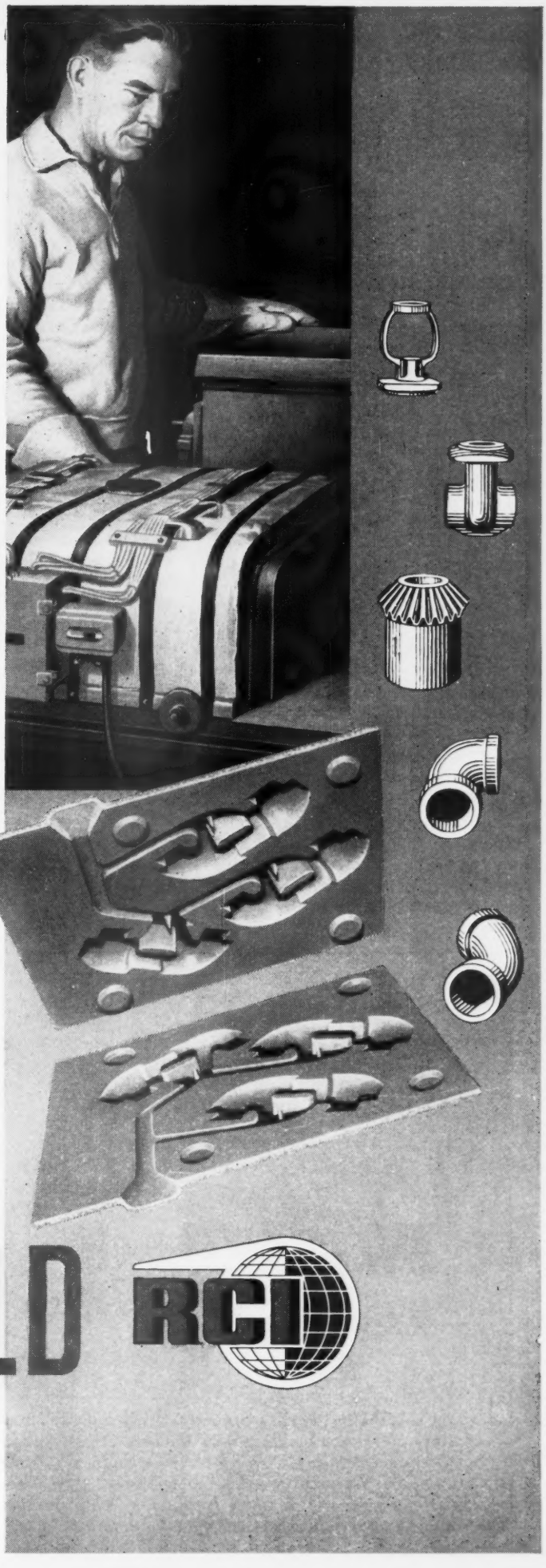


WEST COAST PIG IRON: Carrying out tests to determine the feasibility of smelting iron locally for Pacific Northwest foundries from ores in the area, the U.S. Bureau of Mines Physical Metallurgical Laboratory at Albany, Oreg., uses a 3-phase arc furnace with 3-in. automatically controlled electrodes. This view of the operation shows the control panel and how the charge is handled on the way to the charging deck

FOUNDREZ 7500

A Powdered Phenolic Resin for Making

SHELL MOLDS



• Shell molding heralds a new era in foundry casting methods. And we believe you'll find the key to *lower cost* shell molding in FOUNDREZ 7500. Tests indicate that — due to the greater tensile strength attained with this new RCI powdered phenolic—FOUNDREZ 7500 actually "goes farther" than similar resins, pound for pound, in shell mold production. Sample lots available for your own testing on request from . . .

REICHHOLD CHEMICALS, INC.
630 Fifth Avenue, New York 20, N. Y.

Creative Chemistry . . . Your Partner in Progress

REICHHOLD

RCI

Synthetic Resins • Chemical Colors • Phenolic Plastics • Phenol
Glycerine • Phthalic Anhydride • Maleic Anhydride
Sodium Sulfate • Sodium Sulfite

Industry Briefs

BUDA CO., Harvey, Ill., has sold its assets to Allis-Chalmers Mfg. Co., Milwaukee. Buda stockholders will get one share of Allis-Chalmers common for each two and one-sixth shares of Buda stock. Buda has 413,984 shares outstanding.

* * *

Certified Alloys Co., Bedford, O., has opened a new, modern zinc ingot alloying plant at 9323 Bermudez St., Rivera, Calif., near Los Angeles. To be directed by John Sellon, former head, Zinc Division, National Production Authority, the new plant will house production, research, sales and administrative departments.

* * *

Ipsen Industries Inc., Rockford, Ill., manufacturer of automatic heat treating equipment, has opened a new sales and service division at 146 East Front St., Plainfield, N. J. Alfred E. Stone and John Keegan are sales and service engineers, respectively.

* * *

Tyler Pipe & Foundry Co., 916 East Oakwood, Tyler, Tex., is undertaking a $500,000 mechanized expansion program designed to eliminate waste and to improve its production. Expansion will center at the company's No. 3 plant at Swan and will consist largely of the installation of automatic molding machines. Capacity of the three Tyler area plants will be doubled.

* * *

H. B. Ives Co., New Haven, Conn., has begun work on a new plant on Sanford St., near Dixwell Ave., Hamden, Conn. Scheduled for completion next spring, it will provide 20,000 sq ft of floor space and was designed for an additional 30,000 sq ft. The building will house modern facilities for the manufacture of builders' hardware items produced by the company.

* * *

Industrial Metal Castings Co., Cleveland, has acquired a license to use the Mercast process, which uses frozen mercury patterns in the manufacture of investment castings.

* * *

American Supply & Machinery Manufacturers' Association's new order index reveals that new orders for industrial supplies and machinery were being placed during August at a rate 40 per cent above the base period, July, 1948. The latest figure, 140, compares with 129 in August, 1952, and 155 in July, 1953.

* * *

Pyrene Mfg. Co., Newark, N. J., now is offering air foam fire extinguishing systems through the national organization of Grinnell Co., Providence, R. I., which will handle sales and installation. The arrangement with Grinnell does not alter the sale of Pyrene equipment through its own district offices and jobbers.

* * *

Dravo Corp., Machinery Division, Pittsburgh, has moved its heating department headquarters to the Chamber of Commerce Building, 411 Seventh Ave., Pittsburgh 19. Almost twice as much floor area is available in the new location.

* * *

Lindberg Engineering Co., Chicago, has moved its Air & Hydraulic Division from the main plant on West Hubbard St. to 225 North Laflin St. in order to increase manufacturing facilities for air and hydraulic cylinders and related equipment.

* * *

Eclipse Fuel Engineering Co., Rockford, Ill., has acquired the Solenoid Valve Division of Wheaton Engineering Co., Wheaton, Ill. The purchase includes production equipment, patents, engineering drawings and other assets.

* * *

Alten's Foundry & Machine Works Inc., Lancaster, O., suffered damage to its Plant No. 2 estimated at $8000 when fire swept the paint building Sept. 18. Sparks from a welder's torch ignited paint in a dip tank, according to firemen.

* * *

Harbison-Walker Refractories Co., Pittsburgh, has begun production of super-duty silica brick at its Warm Springs, Calif., works, which until recently was devoted exclusively to the manufacture of basic refractories.

* * *

Baker Industrial Truck Division, Baker-Raulang Co., Cleveland, has appointed Industrial Truck Sales Inc., Latham Traffic Circle, Latham, N. Y., to market its industrial trucks and cranes in western New York.

* * *

Broz Foundry Inc., Clarksville, Mo., a subsidiary of Dulane Corp., has expended $100,000 to double the size of its plant, install new equipment and increase production.

* * *

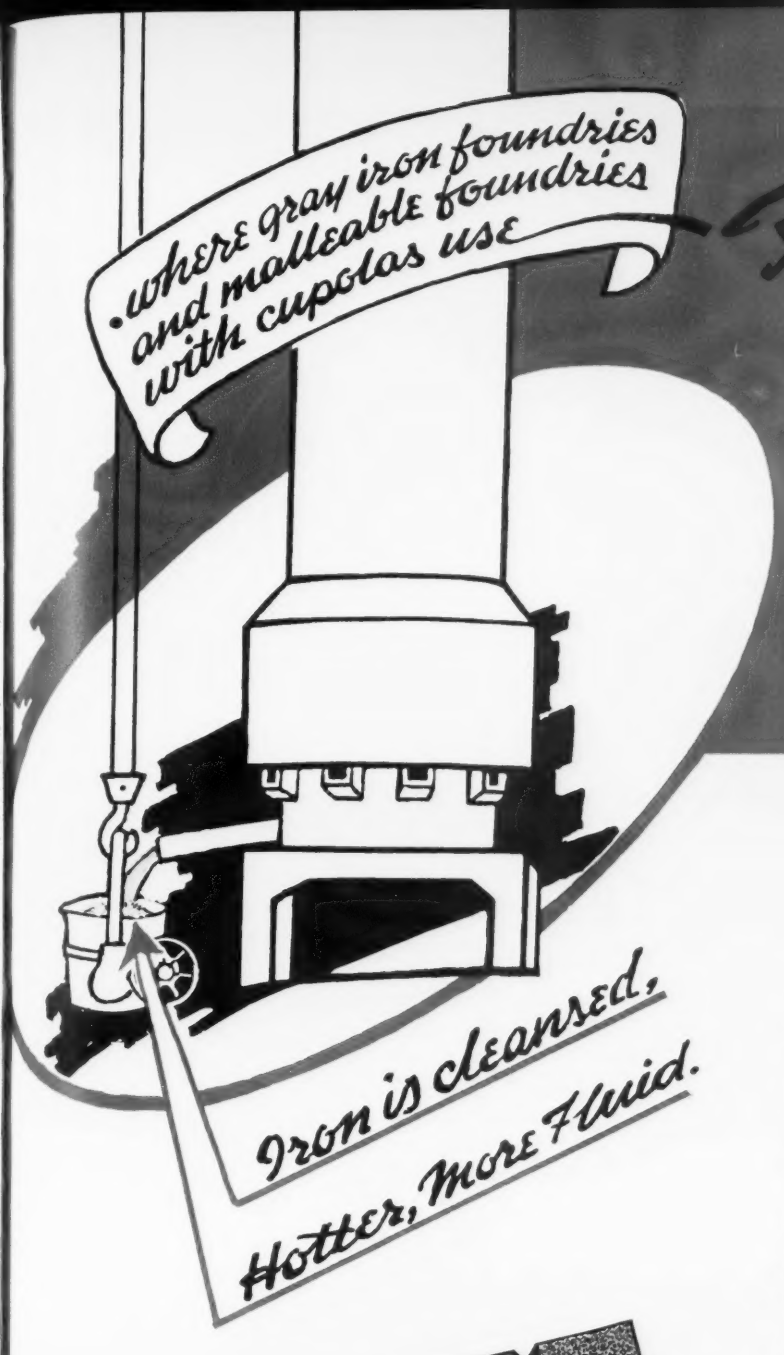
Frederic B. Stevens Inc., Detroit, is distributing new powdered urea, liquid urea and powdered phenolic

(*Continued on page* 197)

MADE IN CANADA: Barber-Greene Co., Aurora, Ill., recently opened a new factory and office building near Toronto, Ont., Canada. Operated by Barber-Greene Canada Ltd., it currently is engaged in the production of belt conveyors, but expansion into other items of the company's line is planned for the future. Existing facilities encompass some 30,000 sq ft and are situated on a 16-acre site with ample room for expansion

where gray iron foundries and malleable foundries with cupolas use

Famous CORNELL CUPOLA FLUX –



YOU SEE THE BEST CASTINGS

If your casting scrap rate runs high and you see other foundries with a scrap pile that is practically nil, it will pay you to do a little sleuthing and find out why.

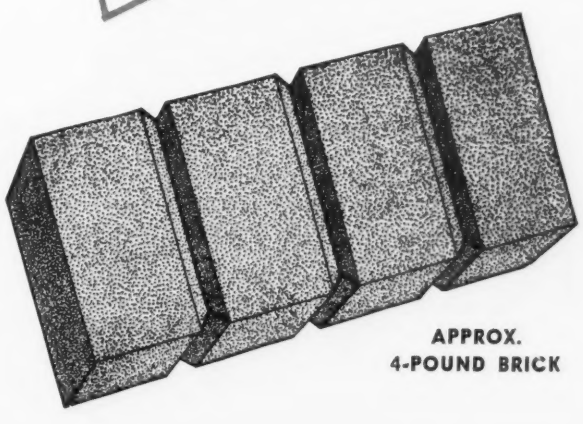
But to save you time, let us pass along the reasons why *right now:*

Famous Cornell Cupola Flux is a metal cleanser with more than 35 years' success in serving leading foundries from coast to coast and Canada.

It not only does a thorough job of removing impurities that are detrimental to production of good, clean iron, but makes it hotter, more fluid, and ensures sounder, cleaner castings.

Famous Cornell Cupola Flux (Scored Brick Form) costs but little to buy and the labor in using is practically nil. Simply lift it out of container and toss it into cupola with each ton charge of iron—that's all.

Famous Cornell Cupola Flux keeps cupolas cleaner, too—reduces maintenance.



APPROX.
4-POUND BRICK

WRITE FOR BULLETIN NO. 46-B

The Cleveland Flux Co.

1026-1040 MAIN AVENUE, N. W., CLEVELAND 13, OHIO

Manufacturers of Iron, Semi-Steel, Malleable, Brass, Bronze, Aluminum and Ladle Fluxes – Since 1918

FAMOUS CORNELL FLUXES
Trade Mark Registered

BRASS FLUX

FAMOUS CORNELL BRASS FLUX cleanses molten brass even when the dirtiest brass turnings or sweepings are used. You pour clean, strong castings which withstand high pressure tests and take a beautiful finish. The use of this flux saves considerable tin and other metals, and keeps crucible and furnace linings cleaner, adds to lining life and reduces maintenance.

ALUMINUM FLUX

FAMOUS CORNELL ALUMINUM FLUX cleanses molten aluminum so that you pour clean, tough castings. No spongy or porous spots even when more scrap is used. Thinner yet stronger sections can be poured. Castings take a higher polish. Exclusive formula reduces obnoxious gases, improves working conditions

ZIRCONIUM, in magnesium extrusion or casting alloys, produces grain refinement and increases room temperature strength. It reduces porosity and increases ductility and toughness. It precipitates iron and improves soundness of castings.

"TAM"* FUSED SALT (Potassium Zirconium Tetrachloride) is used in large quantities in extruded magnesium alloys and in casting alloys free from rare earth additions.

"TAM"* also offers a new ***Master Zirconium*** Alloy containing approximately 32% Zirconium for use in magnesium castings containing rare earth additions.

Write to us at our New York City address for details.

*TAM is a registered trademark.

TAM PRODUCTS
Registered U. S. Pat. Off.

TITANIUM ALLOY MFG. DIVISION
NATIONAL LEAD COMPANY

Executive and Sales Offices: 111 BROADWAY, NEW YORK CITY
General Offices, Works and Research Laboratories: NIAGARA FALLS, N.Y.

(*Continued from page* 194)

core binder resins manufactured by Plaskon Division, which was recently purchased from Libbey-Owens-Ford Glass Co. by Allied Chemical & Dye Corp. Stevens is exclusive distributor of Plaskon Division foundry resins.

* * *

Shallway Corp., Connellsville, Pa., eastern licensee for the manufacture and sale of Shalco shell molding machines, has appointed the following sales representatives: Joseph C. Rindt Co., 20 Wood Ave., Englishtown, N. J.; Aeromotive Engineered Products, Toronto and Montreal; Hoffman Foundry Supply Co., Cleveland; Buckeye Products Co., Cincinnati; Arlington Products Co. for Tennessee and Alabama; Malcolm G. Stevens Co., Arlington, Mass., and E. J. Woodison Co., 146 Chandler St., Buffalo.

* * *

Furnace Division of R-S Products Corp. has been incorporated and its name changed to R-S Furnace Corp., 240 Arch St., York, Pa., a subsidiary of Hardinge Co. The new corporation continues its sales and engineering offices at 4555 Germantown Ave., Philadelphia 44. Personnel will not change.

* * *

Barrett-Craven Co., Chicago, is constructing a 150,000-sq ft plant at Northbrook, Ill., near Chicago. To be ready for occupancy in April, 1954, it will cost approximately $1 million and will combine the manufacturing operations of two Chicago plants and part of the Crescent Truck Co. operation, a subsidiary located in Lebanon, Pa.

* * *

Tri-State Plastic Molding Co., Henderson, Ky., has opened a 10,000-sq ft plant in Owensboro, Ky., increasing the firm's capacity by 15 per cent and releasing space in the Henderson buildings for the die casting division. Last year Tri-State produced $2 million worth of die castings.

* * *

Rockwell Mfg. Co., Pittsburgh, has leased a 70,000-sq ft, three-story factory building at 300 North Lexington Ave., Pittsburgh, from Lawson Mfg. Co., in order to expand its power tool manufacturing operations. Lawson has moved to a larger plant at New Kensington, Pa.

* * *

Palmer-Shile Co., 16033 Fullerton Ave., Detroit 27, manufacturer of materials handling equipment, has added 15,000 sq ft of manufacturing capacity, to be known as Plant No.

(*Concluded on page* 200)

in portable grinders

YOUR BEST BUY IS BUCKEYE

When Southern Sanitary Enameling Co., Nashville, needed an additional portable grinder, naturally they specified Buckeye. Why?

Because their first Buckeye grinder, purchased in 1927, is still in use after 25 years grinding gray iron castings without any down-time for major repairs.

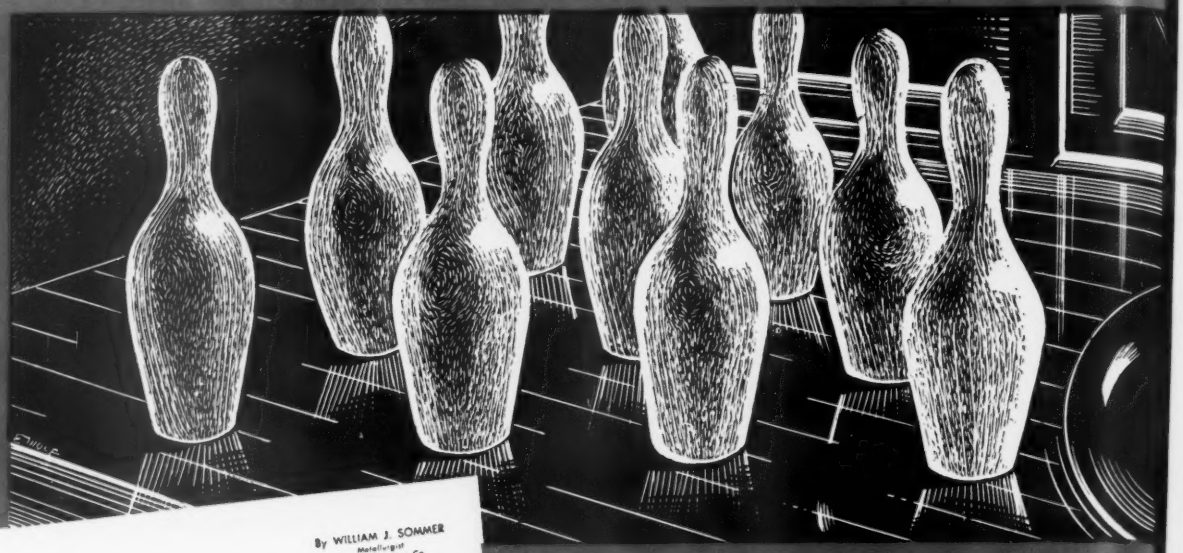
In fact, when this "veteran" finally came back for reconditioning, the original cylinder showed no measurable signs of wear. The only parts replaced were three inexpensive rotor blades.

Unusual? Perhaps, but it does indicate that a Buckeye grinder will provide exceptional service, even on the toughest grinding applications. There are 55 grinders listed in our Air Tools Catalog, one of them designed just for your kind of grinding work. Write today for your copy.

Buckeye Tools CORPORATION
DIVISION 20 • DAYTON 1, OHIO

producers of the world's first successful rotary air tools

uniformity



By WILLIAM J. SOMMER
Metallurgist
Plainville Casting Co.
Plainville, Conn.

Quality Control:

IT'S IN THE REACH OF SMALL FOUNDRIES

Look at your inspection setup. If you're making chemical analyses, inspecting patterns, or castings, chances are you have basic elements needed to start quality control program

WITH THE foundry industry as a whole becoming more and more quality conscious and the larger companies setting up elaborate quality control programs, many

ing group are all too interested in getting the work out and meeting delivery dates. If possible by-pass your standards department or time study men. Their chief concern is getting rate of

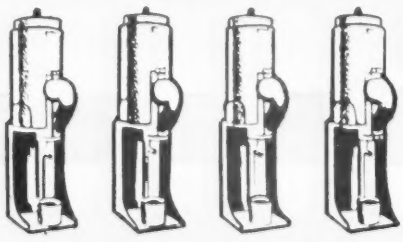
reason for the scrap. The type of scrap record you keep is optional, but it should contain such pertinent data as date, customer's name, pattern number, total cast, total scrap,

let uniform DIXIE BOND help you obtain *quality control*

Uniformity in materials all through the plant, — that is one big, indispensable aid toward the all-important end of quality control. Your molding sand must be uniform. For that uniformity you can depend upon Dixie Bond, produced under the strictest of laboratory control.

That isn't all. With Dixie you get also fast, easy shake-out; longer-lived flasks, more crack-less castings. You benefit from moderate dry and hot strength, the highest green strength known to the industry, high permeability, high flowability, and a high sintering point.

write for our new **DIXIE BOND** *bulletin*



ECP *laboratory control makes for uniformity*

In addition to our own laboratories, four in number, we carry on tests constantly at universities, research institutes and private laboratories. Quality is dependably uniform from car to car.

* DIXIE BOND

The strongest bond clay ever offered American Foundrymen. Moderate dry and hot strength mean easy shake-out and better flowability.

* TRIPLACT

Additive to core and molding sand; reduces scabbing, stops veins and fins in cores, improves finish; imparts higher flowability.

WESTONITE

Versatile chemically coated sand for green sand, skin-dried or dry sand molding. Maximum production, best finish, fewer types of sand needed.

* BLACK HILLS BENTONITE

Highest quality Wyoming bentonite of controlled uniformity. High green strength, high permeability, high dry and hot strength.

REVIVO FIRE CLAY, LAWCO FIRE CLAY, BONDACT FIRE CLAY

Found only in the Lawrence seam in Southern Ohio. Uniformly high refractory value. Use Revivo Fire Clay for highest plasticity, Lawco Fire Clay for general purposes and Bondact Fire Clay for mixes for gun emplacement.

ECP products satisfy a wide range of foundry needs

CUPOLINE

Pre-mixed refractory for patching cupolas by air placement. Eliminates human equation. Produces uniform, dense patch of maximum slag resistance at lower cost.

* REVIVO

Strong, refractory, durable and economical. Unusually high colloidal content. Since 1923, the standard of comparison for refractory bond clays.

* BALANCED REVIVO

Extremely high dry and hot strength. Thermoplastic, gives toughness at high temperatures. Helps eliminate washing and scabbing.

DURA PRODUCTS

Plastic blow tubes, wear inserts and core box gaskets. Life many times that of metal. Cleaner, smoother cores, higher production, less maintenance.

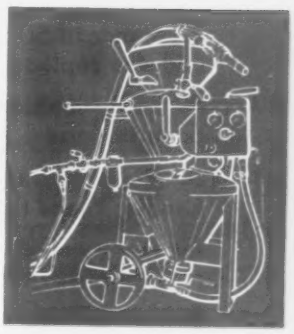
* *ECP Bond Clays and many combinations give you the one right answer for every purpose.*

* REVIVO CORE PASTE

Astonishing strength—35% to 300% stronger than competitive materials. It may be air-dried or oven-dried. Non-boiling.

BONDACTOR

For fast mechanical ramming of refractory linings and patches. Meters a dry refractory mix uniformly. Less bridging, longer heats, more tonnage, cleaner metal from Bondactor-patched cupolas. Saves hard manual labor and reduces costs. →



Minerals International Chemicals

EASTERN CLAY PRODUCTS *Department*

INTERNATIONAL MINERALS & CHEMICAL CORPORATION

General Offices: 20 North Wacker Drive, Chicago 6

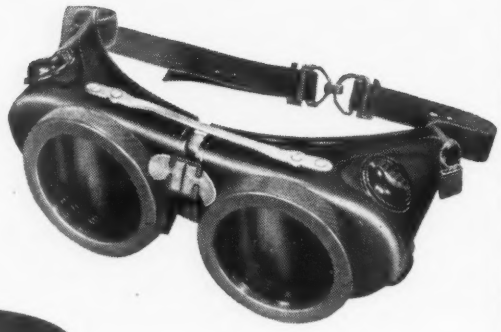
DIXIE BOND • BLACK HILLS BENTONITE • TRIPLACT • REVIVO CORE PASTE • REVIVO BOND • BONDACTOR • CUPOLINE • DURA PRODUCTS • WESTONITE

Try this pair of nylons for longer, more comfortable service!

WILLSON®
Kover-Mor goggles
Strong...Light...Comfortable

For Weldors ▶

Willson *Spatterproof*® cover glass protects *Willson-Weld*® filter glass against pitting. (*Note* four indirect ventilating ports admit ample air but keep out sparks and flashes)



Style CW-70

Style CC-70

◀ For Chippers

Willson *Super-Tough*® lenses are heat-treated for impact resistance. (*Note* four screened eye cup ports admit air to keep lenses fog-free)

Kover-Mor Welding and Chipping Goggles fit easily over larger-frame prescription glasses—use standard 50 mm. round lenses—offer these other new Willson developments:

1. Lightweight nylon offers *highest strength/weight ratio* known for goggle cups; non-flammable; won't conduct heat

2. External screw caps permit *easier lens* changing—no springs or clamps to remove

3. Standard 50 mm. round lenses make it unnecessary to stock odd-size replacement lenses

4. Extra ventilation is provided by slots in screw caps plus ports in cups

5. *Rigid metal top bar* makes Kover-Mor Goggles easier to handle; keeps them firmly in place

Ask your Willson distributor for new Kover-Mor* Welding or Chipping Goggles — strongest lightweight goggles you can get — or write for new bulletin.

Easy to get anywhere!

*Trademark

More Than 300 Safety Products Carry This Famous Trademark
WILLSON®
Established 1870

WILLSON PRODUCTS, INC., 237 Washington St., Reading, Penna.

(*Concluded from page* 197)

4. New equipment to handle increased production also has been purchased.

* * *

A second Los Angeles area plant has been completed in Maywood, Calif., by General Refractories Co., Philadelphia. The plant is equipped with a plate shop where steel plate is cut and formed for plated brick.

* * *

George J. Hagan Co., Pittsburgh, manufacturer of industrial furnaces, has appointed W. P. Wooldridge Co., San Francisco, with branch offices in Los Angeles and Salt Lake City, as western sales representative.

* * *

Holcroft & Co., Detroit, producer of heat treating furnaces, has selected Day Engineering Co., Ardmore, Pa., as representative in eastern Pennsylvania, all of Delaware and parts of Maryland and New Jersey.

* * *

Richard C. Remmey Son Co., Philadelphia, has appointed Eugene M. Lannes, 624 North Main St., Fostoria, O., sales service representative for the Toledo, O., area.

* * *

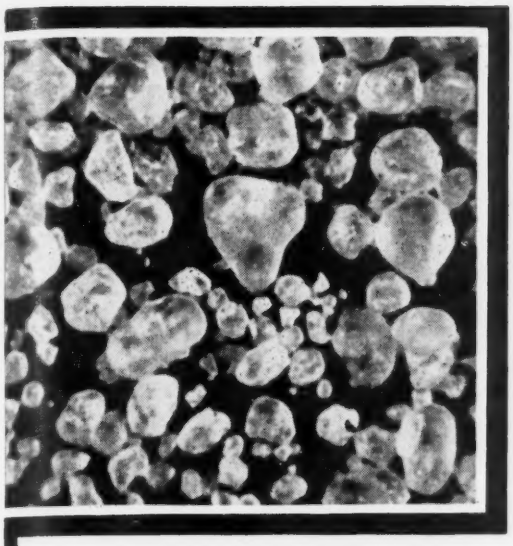
Auto Windshield & Specialty Co., Milford, Conn., will make a 2000-sq ft addition to the rear of the firm's foundry.

Malleable Founders Hold Safety Letter Contest

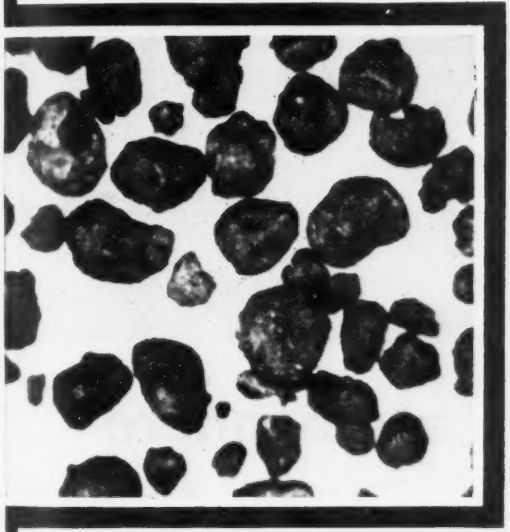
Malleable Founders' Society, Cleveland, is sponsoring a contest for the best letters on safety written by employees of member companies. Four cash prizes totaling $250 will be awarded for the best letters of 1000 words or less submitted on a selected phase of safety in the foundry industry, and the winning letter will be published in FOUNDRY. First, second, third and fourth prizes will be $100, $75, $50 and $25, respectively.

The contest closes Nov. 30. Winners will be announced Jan. 22. Letters are to be written on one of these phases of safety: What One Individual Employee Can Do to Help in a Safety Program; Operation of a Safety Program; and the Human Side of Accident Statistics.

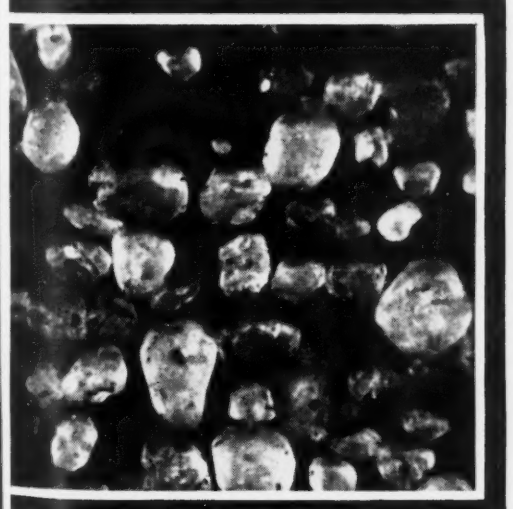
Letters will be judged on originality and on application to the foundry industry. Judges will be Paul Jones, director of public relations, National Safety Council; Lowell D. Ryan, managing director, Malleable Founders' Society; and Frank G. Steinebach, editor, FOUNDRY. All entries should be sent to Malleable Founders' Society, Safety Contest, 1800 Union Commerce Bldg., Cleveland 14.



1. New sand—This is an Ottawa sand



2. Discarded sand



3. Sand reclaimed by Hydro-Blast method. Minute carbonaceous deposits represent coverage of a small percentage of grain surface; therefore do not detract from the physical characteristics of the sand.

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is Better than new sand!

- **Laboratory photomicrographs prove what astute foundrymen already know from first-hand experience**
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- **sharply lower costs of cleaning**
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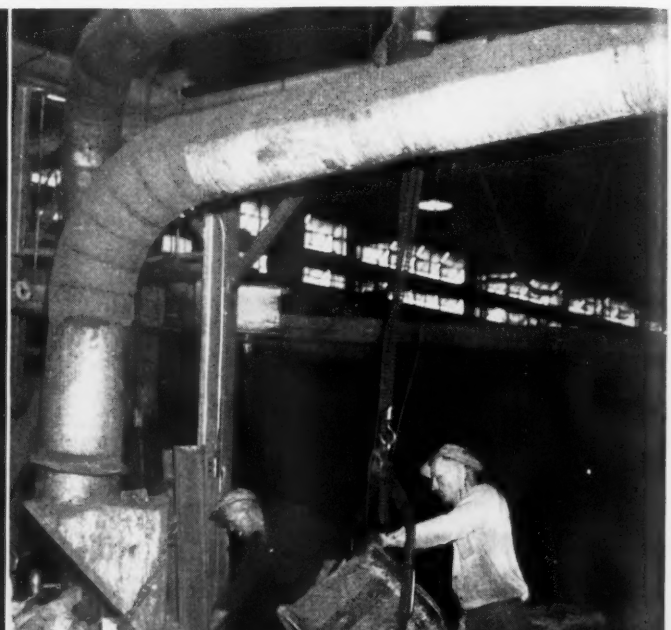

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Dustube dust removal is thorough. At Ontario Malleable Iron Company, Ltd., a Dustube Collector is ventilating the extremely dusty operations of packing and unpacking pots in which hard iron castings are annealed. As the layers of sand and castings are added to the pots, a dust hood efficiently draws off all the dust. When sand and annealed castings are removed from the pots, the Dustube also collects the heavy volume of dust created.

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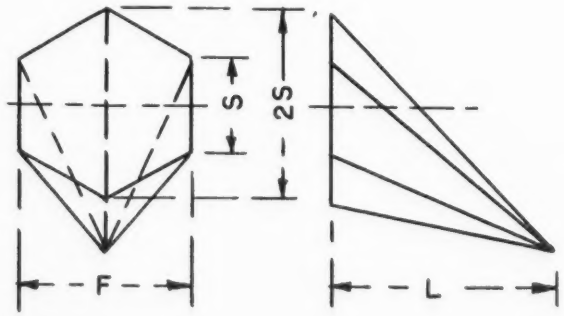
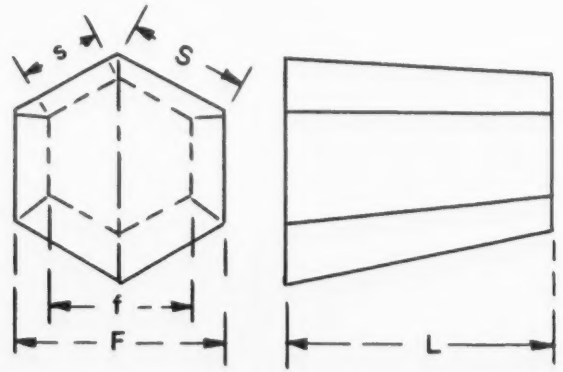
Formulas for Determining Weights of Castings

(Continued from October)



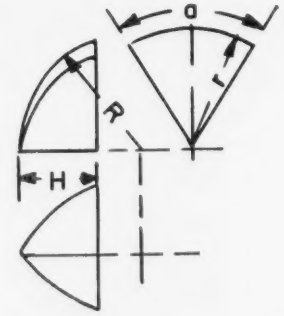
To find the weight of a pyramid with a hexagonal base, multiply the square of a side by the length, by the value of M, (Table IX) or multiply the square of the distance across flats by the length, by the value of C.

$$W = S^2\ L\ M \text{ or } W = F^2\ L\ C$$



To find the weight of a frustrum of a hexagonal pyramid, multiply the sum of the side of the large base squared, the side of small base squared and the product of the two sides, by the length, by M (Table IX) or multiply the sum of the distance across the flats of the large base squared, the distance across the flats of the small base squared and the product of the two sides by the length of C.

$$W = (S^2 + s^2 + S\ s)\ L\ M \text{ or}$$
$$W = (F^2 + f^2 + F\ f)\ L\ C$$



To find the weight of a sector of a spherical segment of one base, multiply the difference between the radius of the sphere and one-third of the height by the height squared, by the number of degrees in the angle by K, (Table X) or to the radius of the base squared multiplied by the height by the number of degrees in the angle by M, add the height cubed multiplied by the number of degrees by C.

$$W = (R - \frac{H}{3})H^2aK \text{ or } W = r^2HaM + H^3aC$$

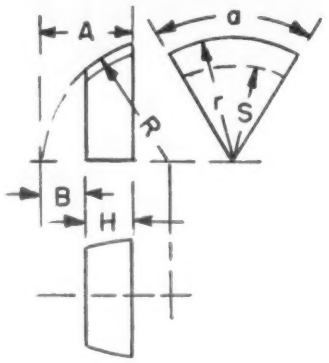
Table X

Wt. per cu. in.	K	M	C	Wt. per cu. in.	K	M	C	Wt. per cu. in.	K	M	C
.096	.00084	.000419	.000140	.250	.00218	.001092	.000363	.410	.00358	.001789	.000596
.100	.00087	.000436	.000145	.260	.00227	.001135	.000378	.420	.00367	.001833	.000611
.110	.00096	.000480	.000160	.270	.00236	.001179	.000393	.430	.00375	.001876	.000625
.120	.00105	.000524	.000174	.280	.00244	.001223	.000407	.440	.00384	.001920	.000640
.130	.00113	.000567	.000189	.290	.00253	.001266	.000421	.450	.00393	.001964	.000654
.140	.00122	.000611	.000203	.300	.00262	.001309	.000436	.460	.00401	.002008	.000669
.150	.00131	.000655	.000218	.310	.00271	.001358	.000450	.470	.00410	.002052	.000684
.160	.00140	.000698	.000238	.320	.00279	.001397	.000465	.480	.00419	.002095	.000698
.170	.00148	.000742	.000247	.330	.00288	.001440	.000480	.490	.00428	.002139	.000712
.180	.00157	.000786	.000261	.340	.00297	.001483	.000495	.500	.00436	.002182	.000727
.190	.00166	.000830	.000276	.350	.00305	.001527	.000509	.510	.00445	.002226	.000741
.200	.00175	.000873	.000291	.360	.00314	.001571	.000524	.520	.00454	.002270	.000756
.210	.00183	.000917	.000305	.370	.00323	.001615	.000538	.530	.00463	.002313	.000770
.220	.00192	.000961	.000319	.380	.00332	.001659	.000558	.540	.00471	.002356	.000785
.230	.00201	.001004	.000334	.390	.00340	.001702	.000567	.550	.00480	.002400	.000800
.240	.00209	.001048	.000349	.400	.00349	.001745	.000582	.560	.00489	.002443	.000815

Interpolation Table

Add'l. Wt.	Add'l. K	Add'l. M	Add'l. C	Add'l. Wt.	Add'l. K	Add'l. M	Add'l. C	Add'l. Wt.	Add'l. K	Add'l. M	Add'l. C
.001	.00001	.000004	.000001	.004	.00003	.000017	.000006	.007	.00006	.000031	.000010
.002	.00002	.000009	.000003	.005	.00004	.000022	.000007	.008	.00007	.000035	.000012
.003	.00003	.000013	.000004	.006	.00005	.000026	.000009	.009	.00008	.000039	.000013

For method of interpolation, see Table II (July issue, page 150)



To find the weight of a sector of a spherical segment of two bases; from the difference between the squares of the distances from the bases to the pole multiplied by the radius of the sphere by the number of degrees in the angle by K, subtract the difference between the cubes of the distances from the bases to the pole multipled by the number of degrees by C, obtained from Table XVII which will appear later, or to the sum of the squares of the radii of the bases multiplied by the height by the number of degrees in the angle by M, add the height cubed multiplied by the number of degrees in the angle by C.

$$W = (A^2 - B^2)RaK - (A^3 - B^3)aC \text{ or}$$
$$W = (r^2 + s^2)HaM + H^3aC$$

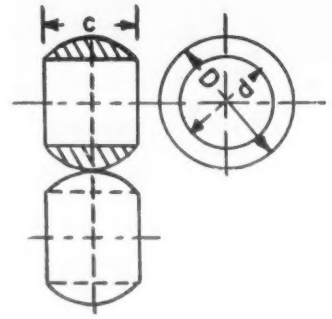
Table XI

Wt. per cu. in.	K	M	Wt. per cu. in.	K	M	Wt. per cu. in.	K	M	Wt. per cu. in.	K	M
.096	.0503	.1005	.210	.1100	.2199	.330	.1723	.3456	.450	.2356	.4713
.100	.0524	.1047	.220	.1152	.2304	.340	.1780	.3561	.460	.2408	.4817
.110	.0576	.1152	.230	.1204	.2408	.350	.1832	.3666	.470	.2460	.4922
.120	.0628	.1257	.240	.1257	.2513	.360	.1885	.3770	.480	.2513	.5026
.130	.0680	.1361	.250	.1309	.2618	.370	.1937	.3875	.490	.2565	.5131
.140	.0732	.1466	.260	.1361	.2722	.380	.1989	.3980	.500	.2617	.5236
.150	.0785	.1571	.270	.1414	.2827	.390	.2042	.4084	.510	.2670	.5341
.160	.0838	.1675	.280	.1466	.2932	.400	.2094	.4189	.520	.2722	.5446
.170	.0881	.1780	.290	.1518	.3037	.410	.2146	.4294	.530	.2774	.5550
.180	.0943	.1885	.300	.1571	.3142	.420	.2199	.4399	.540	.2827	.5654
.190	.0995	.1990	.310	.1623	.3247	.430	.2251	.4504	.550	.2879	.5759
.200	.1047	.2094	.320	.1675	.3352	.440	.2303	.4609	.560	.2931	.5864

Interpolation Table

Add'l. Wt.	Add'l. K	Add'l. M	Add'l. Wt.	Add'l. K	Add'l. M	Add'l. Wt.	Add'l. K	Add'l. M
.001	.0005	.0010	.004	.0021	.0042	.007	.0037	.0073
.002	.0010	.0021	.005	.0026	.0052	.008	.0042	.0084
.003	.0016	.0031	.006	.0031	.0063	.009	.0049	.0094

For method of interpolation, see Table II (July issue, page 150)

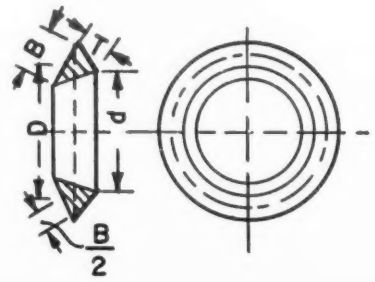


To find the weight of a ring made by cutting a cylindrical hole through the center of sphere, multiply the chord cubed by the value of K corresponding to the weight per cubic inch of material used. (See Table XI).

$$W = C^3K$$

The chord is equal to the square root of the result obtained by substracting the square of the diameter of the hole from the square of the diameter of the sphere.

$$C = \sqrt{D^2 - d^2}$$



To find the weight of a ring of triangular cross section, multiply the base of the triangle by its altitude, by the sum of twice the diameter of the circle described by the center of the base and the diameter described by the vertex of the triangle by the value of K. (Table XI).

$$W = DT(2D + d)K$$

(To Be Continued)

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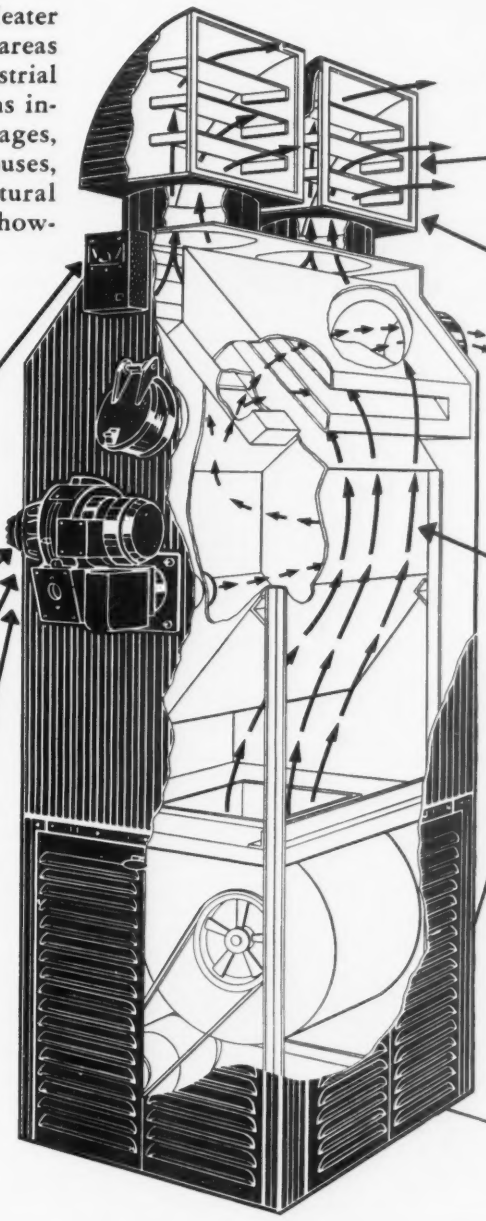

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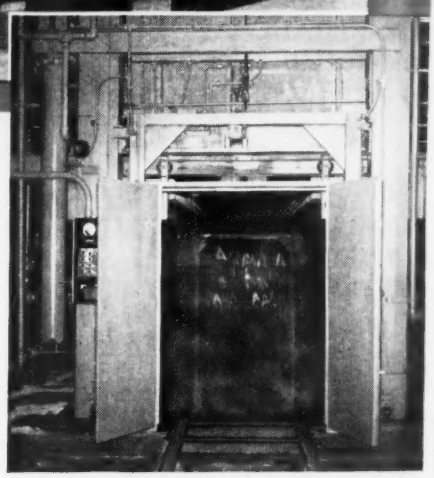

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FIRST NIAGARA FRONTIER CONFERENCE

Meets With Enthusiastic Response

By EDWIN BREMER
Metallurgical Editor

FOUNDRYMEN in the Niagara Frontier area got off to a flying start with their first Regional Conference, held at Hotel Statler, Buffalo, Sept. 17-18. Nearly 600 were present. Western New York Chapter, American Foundrymen's Society, was host.

Participating chapters were Eastern New York, Central New York, Rochester, Ontario, and Northwestern Pennsylvania. Activities during the two-day meeting included 17 sessions, two luncheons and a banquet.

First day's luncheon with Henry Sproul, A. P. Green Fire Brick Co., presiding, had AFS Vice President Frank J. Dost, Sterling Foundry Co., Wellington, O., and Thomas E. Barlow, Eastern Clay Products Division, Chicago, as speakers. Mr. Dost discussed the various activities of the national society, pointing out that members gained greatest benefit by active participation in its affairs.

Discusses High Pressure Molding

Mr. Barlow spoke briefly on use of high pressures for forming sand molds, and said that while experimental work had been done with pressures around 600 psi, commercial application lacks equipment. Such high pressures require specially bonded sands since the water in ordinary molding sands merely squeezes out onto the pattern. However, while present equipment permits use of pressures around 100 to 150 psi only about 20 to 40 per cent of that actually was applied to the molds. He advocated studies to take advantage of all the pressure available, and said that these would result in considerable benefit.

At the Thursday evening banquet Joseph M. Clifford, Atlas Steel Castings Co., Buffalo, presided. Grant S. Diamond, Electro Refractories & Abrasive Corp., Buffalo, introduced Ralph L. Lee, Birmingham, Mich., who presented an entertaining and pertinent talk on "Foundry People as They Come and Are." At the second day's luncheon, with E. J. Burke, Hanna Furnace Corp., Buffalo, presiding, Chester V. Nass, Beardsley & Piper Division, Chicago, presented a motion picture "Mechanization of Core Making" prepared under the auspices of AFS.

Sessions held were divided into general interest and sectional or specific branches of the industry. First general interest session was under the direction of Ezra Kotzin, Allegheny Ludlum Steel Co., Buffalo, as chairman, with co-chairmen A. J. Bzdula, General Electric Co., Pittsfield, Mass.; A. J. Marotta, Utica Radiator Corp., Utica, N. Y.; Ray Olson, Production Foundry & Pattern Co., Chicopee, Mass., and Dr. J. C. Searer, Durez Plastics & Chemicals Inc., North Tonawanda, N. Y.

Speaker was Bernard N. Ames, New York Naval Shipyard, Brooklyn, N. Y., who discussed shell molding. He described the various phases involved in shell molding and pointed out that every casting design is not suited to the process. High tooling costs necessitate volume production. Most important factor is how much can be saved in cleaning room and machine shop by use of shell molding.

Second general interest session dealt with education. A. A. Diebold, Atlas Steel Casting Co., Buffalo, was chairman, and speakers were Otto Guenther, Erie County (N. Y.) Technical Institute, Buffalo, and Earl Strick, Erie Malleable Iron Co., Erie, Pa. Mr. Guenther described training of technicians for the foundry and other industries. Technicians, according to the speaker, fill the niche between professional engineers and skilled workmen. Course is for two years on a co-operative basis, with two students working three months in industry and going to school for three months. Studies include metallurgy, technology, sociology, human relationships, etc. Mr. Strick presented the slide-film "A Career in Metals" prepared by the Northwestern Pennsylvania Chapter.

Third session was devoted to a discussion of the latest development in shell molding, the "D" process by F. S. Brewster, H. W. Dietert Co. Detroit. Chairmen were Warner Bishop, Archer-Daniels-Midland Co., Cleveland; Elton Rogers, E. J. Woodison Co., Detroit, and Bernard N. Ames, New York Naval Shipyard, Brooklyn, N. Y.

Mr. Brewster pointed out that in this process the sand, mixed with a special oil binder, is blown into the space between a shaped box or drier and the pattern; the pattern is removed and the shell baked in a conventional core oven. Hence, only one pattern with sufficient driers to keep the machine occupied is required. Drier can be contoured to permit formation of ribs on the backs of shells for support as well as permitting variations in thickness of the sand shell in different areas. Shells require about 40 minutes baking time.

Fourth session, with J. O. Ochsner, Crouse-Hinds Co., Syracuse, N. Y., and William Parker, General Electric Co., Elmira, N. Y., presiding, had as speaker C. A. Sanders, American Colloid Co., Chicago. He pointed out that green sand molding, notwithstanding the advent of numerous other molding methods, is here to stay since for many types of castings it is the most logical and economical material. With proper attention to details sand molding can produce castings with good dimensional tolerances, approaching in some instances those obtained with other molding mediums. He urged foundrymen to give closer study to sand molding to take advantage of its capabilities.

Presents Shell Molding Film

Closing general interest session was presentation of a new color motion picture, "Making Castings by Shell Molding," prepared by General Motors Corp., with James H. Smith, Central Foundry Division, as narrator. In addition to shell molding the film also depicted numerous improvements in foundry operations to minimize fatigue, and make the industry more attractive to present and prospective operators.

Technical sessions related to gray iron, nonferrous, pattern, steel and malleable iron. First gray iron session, with Walter F. Morton, Anstice Co., Rochester, N. Y., and J. D. James, Cooper-Bessemer Co., Grove City, Pa., as chairmen, dealt with factors influencing gray iron properties. Howard H. Wilder, Vanadium Corp. of America, Detroit, the speaker, listed the factors as mold material, raw material, method of melting, degree of superheat, ladle treatment, alloys and their effects, and limitations in predicting from composition only.

Second session considered recent developments and practical applications of nodular iron. Dr. Gordon Farnham, International Nickel Co. of Canada, and Benton Dixon, Dominion Wheel & Foundries, Toronto, Ont., were speakers. Alexander Pirrie, Standard Sanitary & Dominion Radiator Ltd., Toronto, and F. W. Kellam, Electro Metallurgical Co., Welland, Ont., were chairmen.

Dr. Farnham discussed the effect of various elements on properties of nodular iron and heat treatment. He

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also pointed out that use of cerium in connection with magnesium effectively counteracts the effect of such subversive elements as lead, bismuth, aluminum and titanium. Mr. Dixon stated that production of such iron requires close control, and that gating and risering is quite important. Slag traps aid in eliminating trouble. He pointed out that nodular iron is being employed for crankshafts, dies, gears, hydraulic rams, wheels, railway journal boxes and for many other, varied items of equipment.

Concluding gray iron session, under the direction of N. F. Clement, Rochester-Erie Foundry Co., Rochester, N. Y., and Joseph Gibson, Sweet's Foundry Co., Johnson City, N. Y., dealt with foundry calculations and records, with Kenneth H. Priestly, Vassar Electroloy Products Inc., Vassar, Mich., as speaker. He described electric furnace melting practice and controls employed to obtain close composition specifications. He discussed routine chill tests and their relationship to chemical and physical properties as well as melting, molding and pouring operations, and various record forms used to maintain proper control.

Describes Aluminum-Bronze Alloy

Three sessions were devoted to nonferrous metals. James S. Vanick, International Nickel Co., New York, was speaker at the first, and John A. Feola, Crouse-Hinds Co., Syracuse, N. Y., and Robert Forrest, Lakeside Bronze Co., Buffalo, were chairmen. Mr. Vanick described features of a new nickel-aluminum bronze containing about 9.5 per cent Al, 5 to 6.5 per cent Ni, 1.5 to 3 per cent Mn and 3 to 5 per cent Fe which provides 20 to 30 per cent better yield strength and 10 per cent lighter weight than manganese bronze for marine propellers. It also has much higher corrosion resistance and is not subject to dezincification.

Second session, under the direction of E. S. Lawrence, General Electric Co., Schenectady, N. Y., W. G. Brayer, Bausch & Lomb Optical Co., Rochester, N. Y., and David Stein, Samuel Greenfield Co., Buffalo, dealt with interplay of gas content with shrinkage in causing defective castings. Howard F. Taylor, Massachusetts Institute of Technology, Cambridge, Mass., was the speaker. He pointed out that the freezing or solidification characteristics of many nonferrous alloys require thorough degassing and drastic directional solidification to obtain dense castings with high physical properties.

Concluding session had W. G. Young, William Kennedy & Sons Ltd., Owen Sound, Ont., as speaker, and W. Jones, Candian Westinghouse Co. Ltd., Hamilton, Ont., and Frank Diana, Z. Wagman & Sons Ltd., Toronto, as chairmen. Mr. Young dealt with manganese and aluminum bronzes, pointing out that care is needed in melting to produce satisfactory alloys. Similarly, proper gating is essential in producing sound castings free from defects.

At one of the pattern sessions A. F. Pfieffer, Allis-Chalmers Mfg. Co., Milwaukee, enthusiastically discussed the application of scale models of intricate castings to determine most suitable procedures for molding and coremaking. Chairmen were Harold Brakeman, City Pattern Works, Syracuse, N. Y., and T. J. McLeer, General Electric Co., Schenectady, N. Y.

At a second session J. M. Kreiner, National Malleable & Steel Castings Co., Cleveland, described the various phases of producing interchangeable patterns for freight car couplers. Patterns are made by his firm and others, and are forwarded to eight foundries making the couplers. Richard Wade, Wade & Horrocks Inc., Buffalo, and DeForest Smith, Pattern Makers Inc., Syracuse, N. Y., were chairmen.

Metallurgical control of malleable production was the topic at the only malleable session, with D. J. Merwin, Oriskany Malleable Iron Co., Oriskany, N. Y., and J. W. Clarke, General Electric Co., Erie Pa., presiding. Frank B. Rote, Albion Malleable Iron Co., Albion, Mich., the speaker, described various practices employed at his firm's foundry, including sand control, duplexing and annealing. Synthetic sand is employed and automatic instruments permit close control of moisture and green strength. Analyses made of cupola and air furnace iron are made half-hourly and entered on charts for control means. Annealing is performed in gas-fired, radiant tube furnaces with controlled atmospheric conditions.

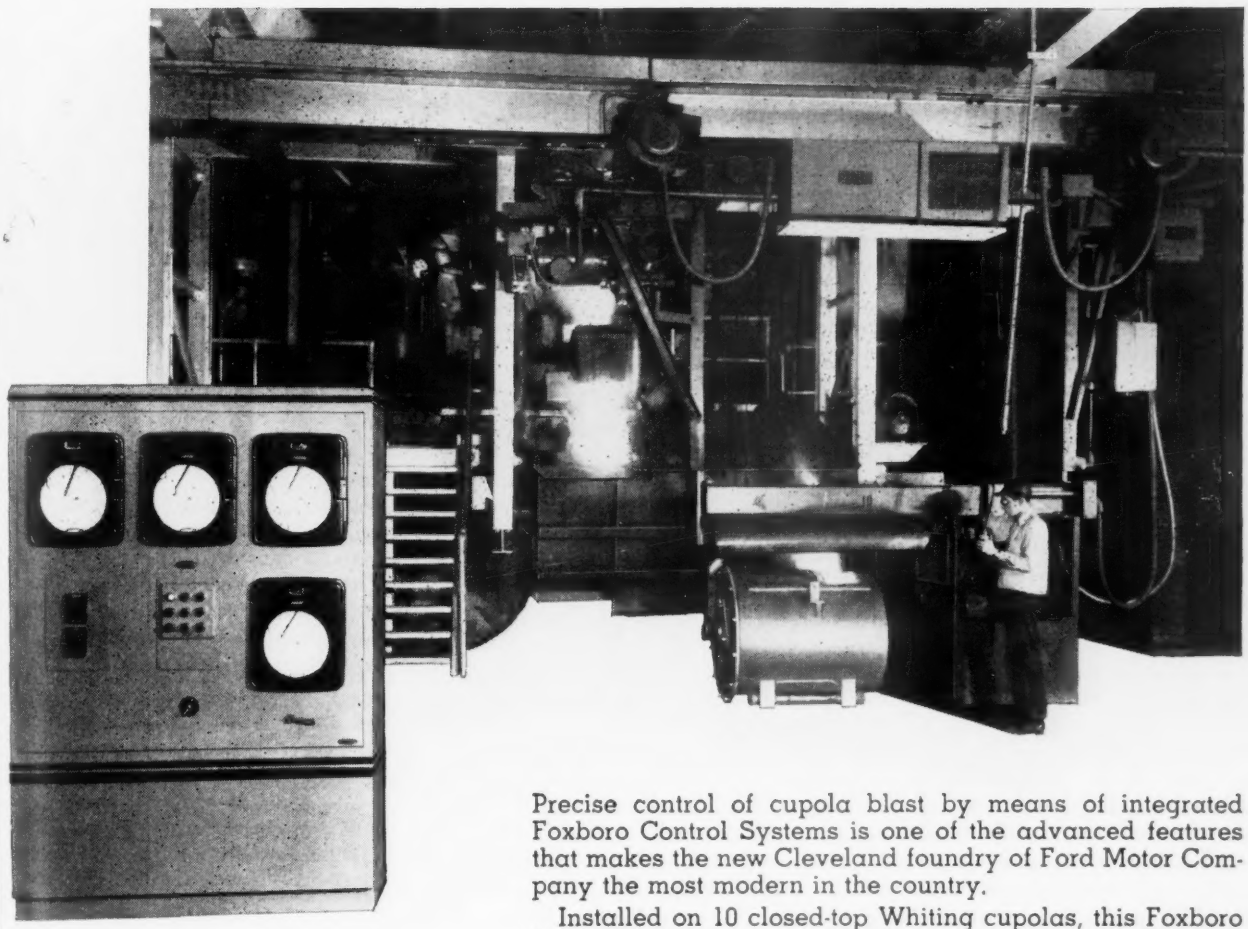
Hold Three Steel Sessions

Three sessions on steel were concerned with factors affecting steel quality, sand reclamation, developments, and new markets for castings. Speaker at the first was Thomas N. Armstrong, International Nickel Co., New York, with T. H. Burke, Worthington Corp., Buffalo, and R. A. Erskine, National Erie Corp., Erie, Pa., presiding. Mr. Armstrong in discussing quality pointed out that to meet exacting mechanical property requirements it is essential to maintain close control on furnace practice so that dissolved gases are low, deoxidation is such as to assure soundness without affecting ductility appreciably, proper balance of carbon and alloys is ob-

(*Concluded on page* 210)

Ford's Newest Foundry Equips for Super-Efficiency

. . . with Foxboro Blast Controls



One of 5 Foxboro Instrument Systems that automatically control blast temperature and air weight for 10 Whiting cupolas in the new Ford Cleveland Foundry.

Precise control of cupola blast by means of integrated Foxboro Control Systems is one of the advanced features that makes the new Cleveland foundry of Ford Motor Company the most modern in the country.

Installed on 10 closed-top Whiting cupolas, this Foxboro Instrumentation is designed for maximum heat economy and continuous production of flawless castings. It not only controls the blast, automatically, by weight of air instead of volume . . . but also closely controls blast temperature by automatic regulation of pre-heaters, regenerators and water sprays.

Ford is one of many leading companies that have equipped their foundries with Foxboro Control. Whether you need an integrated system, or simple instrumentation for your present cupolas, Foxboro Air Weight Control can improve the economy and quality of your production.

THE FOXBORO COMPANY, 3211 NEPONSET AVE., FOXBORO, MASS., U. S. A.

FOXBORO REG. U. S. PAT. OFF. CONTROL SYSTEMS

FACTORIES IN THE UNITED STATES, CANADA AND ENGLAND

(*Continued from page* 208)

tained, and that sulphur and phosphorus are low. Heat treatment also must be controlled precisely. With numerous slides Mr. Armstrong showed effects of aluminum, calcium-silicon, selenium and rare earth metals.

Second session related to sand reclamation. Chairmen were W. Weir, Dominion Foundries & Steel Ltd., Hamilton, Ont., and L. M. Townley, Adirondack Foundries & Steel Co., Watervliet, N. Y. Clyde B. Jenni, General Steel Castings Co., Eddystone, Pa., was the speaker and described two methods employed by his firm for the purpose. One is a dry method where the sand is cleaned by abrasion and impact in an air stream. The other employs wet scrubbing and thermal treatment. First supplies a sand suitable for an all-purpose slinger-molding sand mix while the other results in a sand comparable to new sand. Second method includes use of wet agitators and classifiers, dewatering, and roasting in a multiple-hearth furnace to calcine the sand.

Oxygen Injection Saves Money

Closing session, under the direction of Max T. Ganzauge, General Railway Signal Co., Rochester, N. Y., and J. H. Janssen, Pratt & Letchworth Co., Buffalo, had two speakers. Ray J. Wilcox, Michigan Steel Co., Detroit, pointed out that use of oxygen injection results in reduction of heat time and electric power so that a total saving of about $1 a ton can be obtained on low-carbon steel. In the case of stainless steel oxygen permits use of high-scrap charges. Oxygen is injected at high temperature to minimize chromium loss. Other features mentioned by Mr. Wilcox included use of selenium in stainless steel for reduction of gas porosity, zirconium sand in deep pockets of molds as well as for facing cores and in washes, and application of statistical quality control of variables to obtain better products.

R. M. Dobson, Dominion Foundries & Steel Co. Ltd., Hamilton, Ont., discussed the need for broadening the application of steel castings, and ways and means of accomplishing it. He urged discussion with customers and prospective customers as to why steel castings should be and can be used to replace other methods of fabrication—but to do that the producer must be familiar with the products the customer uses. He also pointed out that steel foundries, by employing the improvements in practice which are available, can do much to increase the stature of steel castings in the consumers' eyes and to enlarge the market for them.

Better Methods Are Aim Of Work Saving Week

A national drive to make work easier in the nation's industrial plants, farms and homes has been organized in the form of Work Saving Week, Nov. 16-20. It is sponsored by Work Saving International, 122 Lynnmoor Dr., Silver Spring, Md., and its purpose is to stimulate interest in improved work methods.

To assist individual plants in developing a successful campaign the central organization is offering a complete kit of instructions for carrying on the program, visual booklets for workers, colorful posters and other material.

The campaign is international in scope and last year proved outstandingly successful in Finland and Germany, where in the Ruhr district, over 47 per cent of the work-saving suggestions received were found to be of value. Further details can be obtained from John R. Immer, director, Work Saving International.

Chicago Plans Study Of Air Pollution

Plans for a $25,000 study to combat air pollution in the Chicago area were outlined at the fall meeting of the Midwestern Air Pollution Prevention Association by Dr. H. A. Leedy, association president, and director of Armour Research Foundation, Illinois Institute of Technology. Purpose of the study is to determine sources of pollution, to examine and analyze case histories of smoke violations in the files of the city's Air Pollution Control department, and to conduct an educational program to inform Chicago residents of the problem and how it can be controlled.

It is anticipated that results of the study will yield basic information for determining the necessary steps for reducing air pollution in the area. About $15,000 of the required funds have been raised.

"I borrowed it from my boy's space suit!"

Seeks Foreign Markets

Sperry Products Inc., Danbury, Conn., manufacturer of ultrasonic and electronic equipment, has appointed Resources & Facilities Corp., New York, to develop license and sales arrangements of its patented products in Europe and the Far East.

Spherulite Formation

(*Continued from page* 103)

brium) and a concentration gradient results. Some cementite plates, the graphitization of which did not yet start and which are in contact with such carbon impoverished austenite, are dissolved in it and their carbon in excess of stable equilibrium is forwarded to the growing graphite particle; each of those particles has its influence zone.

The very complicated surface and irregular shape of the resulting graphite particle are well known; the reason therefore seems to be: anisotropic crystallization environment and consequently irregular moving away (self-diffusion) of the iron atoms.

For Mg-treated white iron the austenite phase is supposed to be highly supersaturated; this seems to be in agreement with the cooling curves of white Mg-treated iron (see for instance, curves *G4* and *G4b*, Fig. 5, *Metal Progress*, p. 800, June 1951).

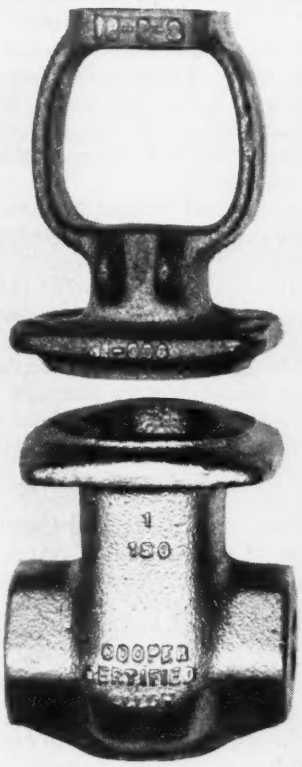
By subsequent malleablization of such white iron graphitization starts, not by decomposition of a cementite particle (that happens to take some time), but by precipitation of carbon at a high concentration point in the supersaturated austenite (in many cases such graphitization points already exist in austenite and were formed while the casting cooled).

The further growth of the graphite particle occurs now in an isotropic environment and gives way to a spherulite (except when the growing crystal hits an inclusion; in that case a deformed crystal results).

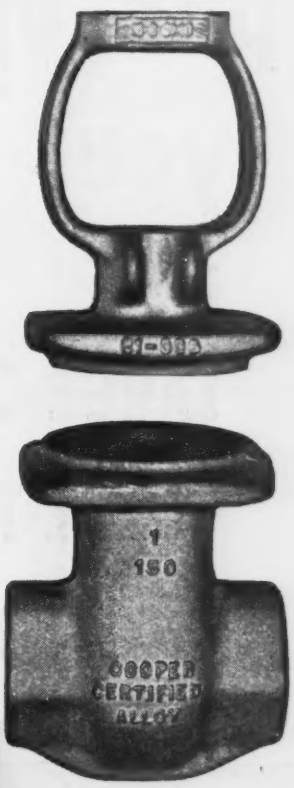
The growing mechanism is the same as described here above for graphitization during solidification, except that it is much slower now as a result of lower temperature and lower diffusion rate; the cementite particles are dissolved in austenite in

(*Continued on page* 212)

"Here's why COOPER ALLOY uses GENERAL ELECTRIC SHELL RESINS"



—says Morton L. Katz, Chief Shell Mold Engineer, Cooper Alloy Foundry Co., Hillside, New Jersey



At left—conventional sand-molded stainless-steel valve bonnet and body.

At right—shell-molded bonnet and body. Notice superior surface finish and legibility of identification on shell-molded castings.

"General Electric resins are used extensively in our shell-molding operations because of their extremely high strength, good reproductivity and minimum reaction with molten stainless steel. By selecting proper resins, we are able to assure high productivity and superior quality."

This experience of a foundry that was "into" shell casting from the beginning is worth *your* consideration. The new shell process, offering smoother surface finish, better dimensional stability and greater yield per man-hour than conventional sand-casting methods, may mean important savings for you and your customers.

Ask G.E. about shell casting

General Electric offers you a "team" of products to help you get maximum benefits from shell casting. *G-E phenolic shell resins help* you make strong, dimensionally accurate sand shells with smooth surfaces and sharp contours. *SM-55 silicone parting agent* helps you obtain quick, easy release of shells from patterns. *Send the coupon today for free samples and technical data!*

You can put your confidence in—

GENERAL ELECTRIC

Send coupon today for more details!

General Electric Company
Section 1317-4A, Chemical Division
Pittsfield, Massachusetts

Please send me:

Data	Sample	
( )	( )	G-E phenolic shell resin (medium cure)
( )	( )	G-E phenolic shell resin (fast cure)
( )	( )	SM-55 silicone parting agent

I want this for: ( ) Reference purposes only ( ) An immediate application on_____

Name_____

Firm_____

Street_____

City_____ Zone____ State_____

(*Continued from page* 210)

which a concentration gradient exists and their carbon in excess of the stable equilibrium content is forwarded to the growing spherulite.

Answers the Questions—The considerations above bring us a plausible answer to the questions how and why. How? According to the described mechanism. Why? Because austenite is supersaturated.

But the second answer implies another question. Why does a Mg-treatment (or one of the many others) provoke the supersaturation of austenite? An answer to this question was given some years ago by the author:[8] Elimination of the specific graphite nuclei mainly through reduction of silica particles; from this results supercooling and austenite supersaturation.

If it appears difficult to prove this hypothesis, it is equally difficult to disprove it and, at least, the supercooling argues in favor of it. Moreover, all the elements capable of reducing SiO_2 (except Al, the reaction product of which (Al_2O_3) may also, according to the same hypothesis, be considered as a specific graphite nucleus) have succeeded in forcing spherulitic graphite crystallization, at least partly. These elements belong to the series of the strong reducing elements—Ce, Mg, Ca, Li, Sr, Ba, Na and K.

If the hypothesis of graphite nuclei destruction through reduction provides a plausible explanation, it is certainly not complete because some spherulites at least have been obtained with such elements as S, Te, Se, Bi, and recently we obtained some spherulites with Zn.[2] None of these five elements is capable of reducing SiO_2.

It should be remembered, however, that their efficiency in spherulite formation is poor compared to that of the strong deoxidizers and they only permit obtaining some spherulites rather than a really nodular iron. Nevertheless, their effect must be considered and it appears logical to seek for an (complementary) explanation in the way of a common property of all the so-called nodulizing elements.

Such a common property may be the vapor tension of those elements the value of which may be estimated by the location of their boiling point in the temperature scale (Fig. 5).

In Fig. 6 the boiling points of the nodulizing elements are compared with the solidification range of cast iron. From this comparison it appears clearly that all these elements may form gas bubbles in the liquid iron.

(*Continued on page* 218)

USE-
MONORAIL
for
Modern Foundry Handling

Free moving cranes cover large pouring floor

It meets all requirements for space limitation. Uses overhead space under congested areas.

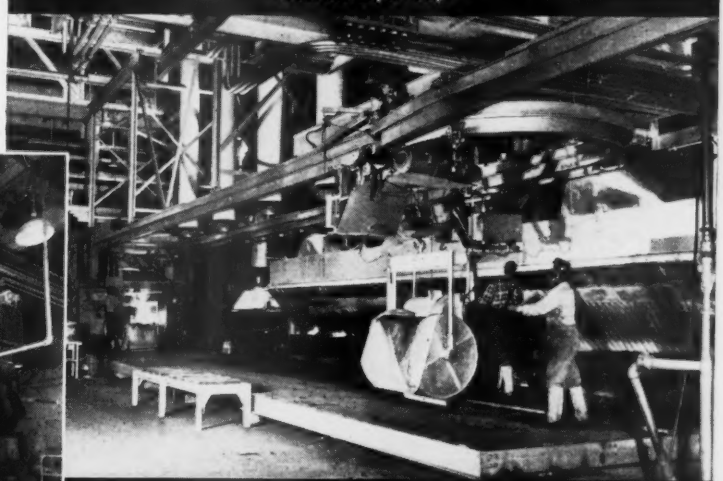
Versatile application. Hand or power operated carriers . . . many automatic features available.

MonoRail is permanent, inexpensive and has extremely low maintenance costs.

SEND FOR BULLETIN C-1

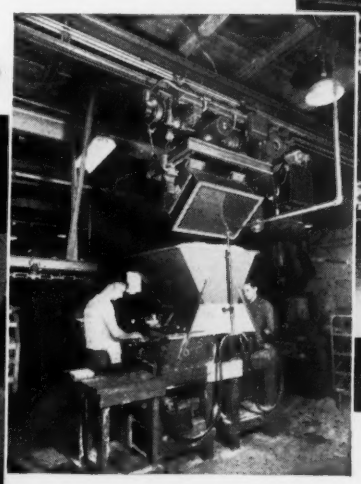
or we'll be glad to have our representative call on you.

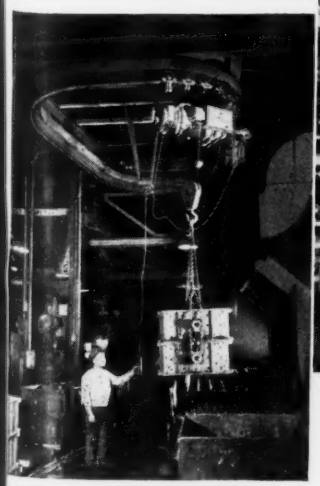
Hand pushed cranes serve mold preparation from conveyor loop



Continuous pouring with MonoTractor Carriers

Automatic dispatch delivery of fresh core sand





MonoTractor carrier serves shakeout from MonoRail loop

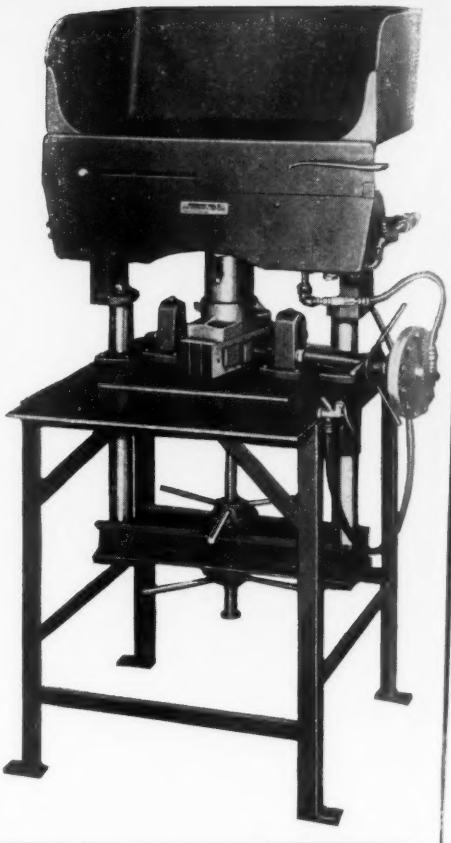
AMERICAN OVERHEAD HANDLING EQUIPMENT

AMERICAN MONORAIL COMPANY

13104 ATHENS AVENUE • CLEVELAND 7, OHIO

Redford CORE BLOWERS

Assure MAXIMUM Production With MINIMUM Effort



THE NO. 2 STATIONARY MAGAZINE TYPE

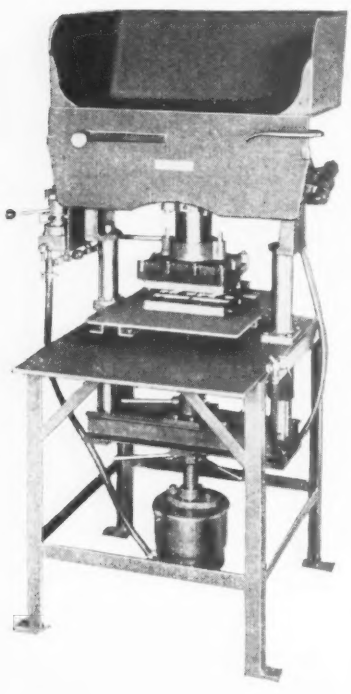
8 OUTSTANDING FEATURES:

1. Large stationary work area.
2. Large sand supply hopper.
3. Stationary sand magazine.
4. Easy accurate locating of core boxes.
5. Quick change magazine heads.
6. Quick adjustment for different height core boxes.
7. Quick change, fully adjustable, vertical clamping attachment.
8. Actuating one handle clamps the core box, blows the core and releases the core box, in two seconds.

CAPACITY: Cores up to 5#

Write for Specification Bulletin "F"

THE No. 2-D CORE BLOWER



A fast and accurate DRAW TYPE core blower for small work—has stationary sand magazine and many additional features assuring maximum production. Quickly adjusted to accommodate core boxes not requiring the draw feature. Can be equipped with clamping attachment for vertically split core boxes.

SIX FEATURES:

1. MAXIMUM SAFETY—Operator must use both hands at once to clamp core box and blow cores.
2. ACCURATE DRAW—Stationary sand magazine and long lead on draw table shaft assure accurate draw.
3. ADJUSTABLE LENGTH OF DRAW—Quickly changed without changing height of table.
4. FLEXIBILITY—Easy adjustments permit use of draw feature even on short run jobs. Draw type magazine heads having removable blow plates are interchangeable with regular No. 2 magazine heads.
5. CORE BOX VIBRATION—Controlled by keeping draw valve handle depressed during draw operation.
6. PROVEN—The No. 2-D is being used in leading foundries everywhere. Backed by the Redford reputation for quality equipment.

Write for Specification Bulletin "D"

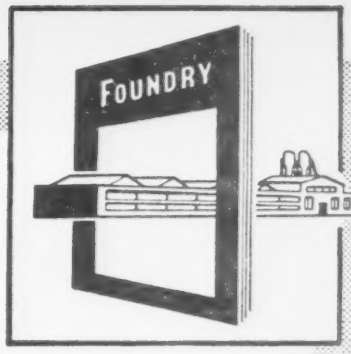
THE CARTRIDGE TYPE BENCH CORE BLOWER

The original small core blower . . . Proven simplicity, speed and flexibility. Makes cores up to 2#. Thousands in use in American Foundries . .

Write for Specification Bulletin "G"

Redford IRON & EQUIPMENT CO.

20733 GLENDALE AVENUE • Phone KEnwood 1-8611 • DETROIT 23, MICHIGAN



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BUSINESS REPLY CARD
No Postage Stamp Necessary if Mailed in the United States

4c POSTAGE WILL BE PAID BY—

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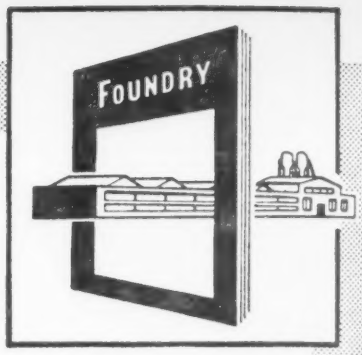

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FOUNDRY
Readers Service

A Sure Fire Team

DAVENPORT ROLL-OVER AND JOLT STRIPPER

DAVENPORT

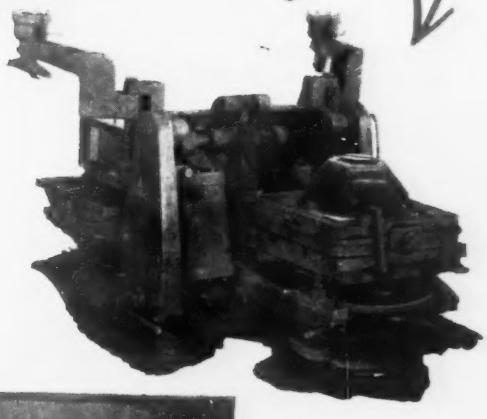
A Perfect Team—

A Davenport Roll-Over and Jolt Stripper will produce perfect cope and drag molds —with less labor.

Davenport gives you as a standard feature the most accurate draw on today's market.

Our engineers are available to you at your convenience.

Write today for your complete catalog.



A team of Davenport Molding Machines in action. Making cope and drag molds for an air-engine clutch housing.

DAVENPORT MACHINE AND Foundry Company DAVENPORT IOWA

REPRESENTATIVES

C. E. Holmes
Birmingham, Alabama

McArdle Equipment Co.
Houston, Texas

C. W. Lueders
Riverton, New Jersey

Teller Equipment Co.
Port Murray, New Jersey

Grant & Company
Los Angeles, California

R. K. Price Associates, Inc.
625 Madison Ave., New York 22, N. Y.

Canadian Foundry Supplies & Equip. Ltd., Toronto & Montreal

Ph. Bonvillain & E. Ronceray, Choisy-Le-Roi, Rue Paul Carle, Seine, France

(*Continued from page* 212)

If there is a cause and effect relationship between the gas bubbles in the liquid iron and the successive phenomena—supercooling, supersaturation of the austenite, and spherulitic crystallization of the graphite—one should notice at once the particularly favorable position of Mg.

Indeed, as the boiling point of Mg is inferior to the temperature of the solidification range of cast iron, the vapor tension of Mg, although higher than 1 atmosphere, does not seem sufficient to force complete elimination of Mg gas bubbles. On the other hand, we know that the chances of successful treatment wth Li, Sr and particularly with Ca and Ba are so much better that the temperature of the iron at the moment of treatment is higher and the success of a treatment depends on the realization of an intimate emulsion between liquid iron and the vapors of the nodulizing element. Of course, this last remark does not wholly apply for Ce, as this element is soluble in the iron.

Presents Many Difficulties

For the elements Na and K, the vapor tension is so high that not only the intimate emulsion is difficult to realize but the maintaining of the corresponding gas bubbles appears very difficult, if not totally impossible.

The production of spherulites with S as nodulizing element seems to be in relation with the presence of FeS or at least mixed crystals xFeS,yMnS sufficiently rich in FeS.

R. V. Riley[9] has obtained very effective desulphurization (final sulphur =0.005 per cent) by melting in vacuum; this result proves without doubt that the vapor tension of S is sufficient to produce S-gas bubbles in liquid iron (if sulphur is high enough as is necessary for the production of spherulites).

On the other hand, spherulites are formed by malleablization of white iron with incorrect Mn-S balance.

The concurrence—FeS; S-gas bubbles; supersaturated austenite and some resulting spherulites—seems at least very curious. Thus sulphur and a desulphurizing (which is deoxidizing at the same time) element may produce spherulites if the former or the latter is in excess of the stoichiometric ratio by which they neutralize each other.

It thus appears that the "desulphurizer" requirement as stated by Morrough and Williams[10] is not necessary; the same applies for the two other requirements imposed by these authors: "carbide stabilizer" and "easily soluble in the iron".

The action of Se is probably similar to that of S, because Se is also soluble and forms Fe-Se compounds.

Zn, the boiling temperature of which is relatively low, gives way to a violent reaction when added as element to the molten iron; the reaction is similar to that of Na. On the contrary, when added as brass or as Ni-Zn alloy, the reaction is not quiet at all but there is no significant amount of metal ejected.

The results of a dozen of Zn-treatments[2] were rather poor; some spherulites, most of them deformed and generally assembled in ferritic zones, resulted.

Cause and Effect—If one seeks for the cause and effect relationship between gas bubbles and the formation of graphite spherulites, one is naturally inclined to consider the isolation and (or) the vitiation of the nuclei.

"Quit shouting 'All Aboard', Jackson!

If gas bubbles are in emulsion in a liquid solution, they will attach or fix themselves on solid particles in suspension in that solution; similarly if an element in solution is vaporized, the gas bubble of that element will precipitate at the interface liquid solution-solid particle in suspension and this will happen so much the easier as the surface of the solid particle is rougher. So it may happen that solid particles in suspension in liquid iron, and, among them, the silica slime particles, are separated from the liquid iron by a gas bubble or an absorbed gas layer.

If we consider the elements classified in Fig. 5, it appears that they may be divided into two groups, separated by the temperature of the cast iron solidification range. For the elements of the group with high boiling point the gas bubbles cannot exist anymore at the solidification temperature. During the cooling of the liquid iron, the element that formed the gas bubble or gas layer will condense on the solid particle on which the gas layer was adsorbed.

If that particular particle was a specific graphite nucleus, it appears possible, if not likely, that this particle loses its property of specific nucleus and thus becomes a vitiated nucleus.

For the elements with low boiling point it is evident that the gas bubble or adsorbed layer may isolate the nucleus that once again becomes inefficient.

According to the hypothesis considered above, the production of nodular iron by gas effect only would necessitate the isolation or poisoning (vitiation) of all specific graphite nuclei. Judging by the results obtained with the elements S, Se, Te, Bi, Zn, it appears doubtful that one may practically succeed to produce nodular iron with gas effect only. It is possible however that the spherulites obtained with these elements result from isolation or vitiation of specific graphite nuclei, followed by supercooling, austenite supersaturation and finally graphite precipitation and spherulitic growth.

For the strong reducing elements of the series Ce, Mg, Ca, Li, Sr, Ba, Na, and K, the deoxidation seems to be an important factor; it is quite possible that gases may contribute by neutralizing undestroyed nuclei (total reduction appears difficult, as the emulsion is never perfect, specially with the elements that have a high boiling temperature) but even the added influence of the two factors is very often insufficient.

Very frequently, if not always, it happens that solidification goes on according to the spheroidal graphite system except for the very last liquid that solidifies as an eutectic with intercellular distribution. The proportion of this eutectic may be insignificant but the influence of this intercellular material (enriched with impurities) on the mechanical properties seems to be very important and probably responsible for some low impact values although elongations in a normal tensile test are not so very low.

Summary—This article should be considered as a tentative complete theory of graphite spherulite formation in nodular iron; together with experimental results it gives more accurate details on the mechanism of spherulite formation and growth, according to a hypothesis put forward by the author[5] in 1950 and supported by Wittmoser[6] in 1951.

The supersaturation of austenite is considered as a fundamental requirement; this supersaturation is determined by the supercooling resulting itself from specific graphite nuclei de-

(*Concluded on page* 220)

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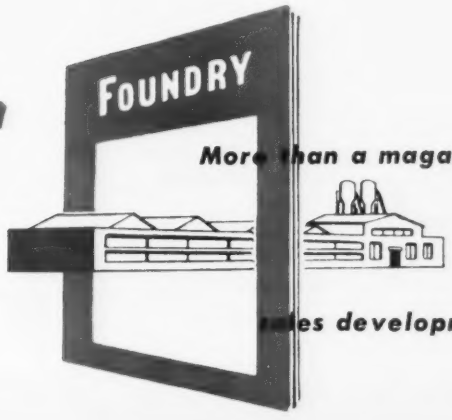
What is PLUS 5? It's your key to more business from foundries. It gives every FOUNDRY advertiser a bonus he can get from no other source. Here is help in analyzing this market—studying sales territories and potentials—planning the sales effort—and creating a constructive promotion program to the 5 billion dollar foundry market. It's time to take a new look at this market—and at the unusual selling aids we have for you. Say PLUS 5 to your FOUNDRY representative and he'll show you this 5-step program designed to move more of your products into foundries.



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(*Concluded from page 218*)

struction through deoxidation according to a hypothesis formulated by the author[8] in 1948 and probably (complementary) resulting also from nuclei vitiation and (or) isolation through gas bubbles or adsorbed layers of the addition elements according to a hypothesis put forward in this article.

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Gray Iron Founders Meet

(*Continued from page 149*)

total over $300,000.

Stuart F. Heinritz, editor of *Purchasing*, New York, admonished the group to "help yourself by helping the purchasing agent." Mr. Heinritz pointed out that a variation of 5 per cent in the efficiency of purchasing performance can mean the difference between profit and loss on the balance sheet. Purchasing is, first of all, a process of selection. Without competition, without the privilege of choice between alternative materials and sources of supply, there would be no need for purchasing agents and procurement would be a clerical routine.

But too many people outside of purchasing still regard the purchasing agent's primary concern with competition as a matter of trading — playing off one supplier against another to achieve a lower and perhaps ruinous price. Mr. Heinritz believes that such tactics may have existed in the past, but are outmoded concepts of purchasing and competition.

The purchasing agent who is looking at his problem from the functional viewpoint rather than a cut and dried specification knows that several different products or materials will fill the need. To make a wise selection, he must determine which material or fabricating process offers the greatest advantage or combination of advantages, to give his company the best ultimate value.

In conclusion, Mr. Heinritz stated that the purchasing agent may be buying castings or stampings, or tubing, or motors, or other products, but essentially what he is trying to do is buy value. Castings are significant to him only if they contribute value to his own product. The salesman who gets the business is the one who sells not only castings, but also service and value to the buyer.

The concluding paper, "Marketing in Today's Economy," was presented by Francis L. Fletcher, partner, Anderson & Sessions, Philadelphia. Marketing, he said, is simply finding out the facts necessary to solve problems in selling and analyzing these facts so that action can be taken. Companies become successful or fail on their adjustments to marketing problems and on the collection and use of information on which to make sales decisions.

Mr. Fletcher pointed out that development of new products has changed our economy substantially in recent years; this trend likely will continue. The successful companies will gather facts in terms of what these developments mean and be guided accordingly; they will not sit on their hands and continue to make the same products for the same customers in the hope that the world won't change.

Gathering marketing information should start with an internal analysis of what the individual company is doing, but it can be aided materially by using the trade association as a source of data for the industry. Mr. Fletcher believes that the gray iron industry has great vitality which can enhance its opportunities, if we enter a more competitive economy, by allocating a certain amount of time to finding out those facts which will influence its future.

Herman hasn't had an accident in the ten years he has worked here

At the closing luncheon session, the society's annual citations and awards were presented. Frank G. Steinebach, editor, FOUNDRY, received the organization's highest award, the gold medal, for "his outstanding personal and professional contributions to the general welfare of the industry, for his progressive promotion of ideas for bettering the industry by personal services in foundry organizations and as editor of FOUNDRY, for his service and advice to the gray iron foundries while serving with the War Production Board in World War II, for his meritorious services in connection with the formation and maintenance of the National Castings Council, and for his sincere interest in and cooperation with the society at all times."

Presents Other Awards

Also cited for outstanding and unselfish services to the industry and the society were Herbert R. Lafferty, executive vice president, Red Jacket Mfg. Co., Davenport, Iowa, and William Beiser, president, the Reliance Foundry Co., Cincinnati.

George K. Stauffer, vice president, Reading Gray Iron Castings Inc., Reading, Pa., was presented first prize of $300 in the society's 1953 redesign contest. Second place of $150 went to A. J. Hall, Hallstead Iron Foundry, Hallstead, Pa. George Green, Textile Machine Works, Reading, Pa., a prize winner in the 1952 contest, was awarded an additional $50 on last year's entry.

In the annual election of officers, Henry J. Trenkamp, Ohio Foundry Co., Cleveland, was re-elected president for a second term. Charles R. Ker, Dalton Foundries Inc., Warsaw, Ind., and secretary the past year, was elected vice president. Walter O. Larson, the W. O. Larson Foundry Co., Crafton, O., was re-elected treasurer, and E. D. Huffschmidt, Western Foundry Co., Portland, Oreg., was named secretary.

New directors elected include: J. C. Alberts, Plainville Castings Co., Plainville, Conn.; C. H. Meminger, Posey Iron Works Inc., Lancaster, Pa.; Mr. Ker (incumbent); J. W. Simmons Jr., Cox Foundry & Machine Co., Atlanta; G. L. Nimocks, Dayton Foundry, Hollydale, Calif., and Summerfield Brunk, Headford Bros. & Hitchins Foundry Co., Waterloo, Iowa.

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Furnace Output, pieces per hour	70	100	Increased 43%
Heating-Up Time, minutes	210	35	Reduced 83.3%
Cycle Time, minutes	50	30	Reduced 40%
In addition:			
Fuel consumption during heating up			Reduced 83%
Fuel consumption during operation			Reduced 50%

ANNEALING FURNACE
Comparative Furnace Tests

	Standard Firebrick	B&W IFB	Change With B&W IFB
Heating-Up Time, hours	52	31	Decreased 40%
Total Cycle Time, hours	131	114	Decreased 13%
Fuel Consumption, lbs./cycle	12,792	8,159	Decreased 36%
Yearly Output, tons	946	1,100	Increased 16%

MAGNESIUM MELTING CRUCIBLE FURNACE
Comparative Furnace Tests

	Ordinary Firebrick	B&W IFB	Change With B&W IFB
Fuel Consumption BTU/HR	1,000,000	500,000	Decreased 50%
Control	100 to 150 F overshoot of critical pouring temperature	no overshoot of critical pouring temperature	

What's behind these remarkable records of B&W IFB? Light weight for one—in fact B&W IFB is lighter in weight than any other insulating firebrick. This means they store and conduct less heat, provide faster heating-up time and lower fuel consumption. These brick also respond rapidly to changes in heat input, assuring excellent temperature control.

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R-483

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Activities of Foundry Groups

Pittsburgh

FIRST meeting of the 1953-54 season of the Pittsburgh Foundrymen's Association was held Sept. 21 at Webster Hall Hotel with approximately 145 members and guests present. New officers were introduced by Frank B. Mahoney, retiring president, who passed his gavel to F. H. Reuwer, Westinghouse Electric Corp. Harold Gassner, Rosedale Foundry & Machine Co., is the newly elected vice president while E. P. Buchanan of Pittsburgh Coke & Chemical Co. remains as secretary-treasurer.

Featured speaker was E. A. Graham, for the past 10 years foundry superintendent of Edgar Thomson Works, U. S. Steel Corp. He discussed innovations in equipment, layout and production techniques at the company's $7.5 million ingot mold foundry which is soon to be completed. Capacity will be increased from 19,000 tons of castings a month to 25,000 tons. Design features provide greatest possible safety for workers, highest quality of product and economical operation.

As a new safety feature the foundry will have ramming machines operated by two men whereas formerly 40 men used hand-operated rammers. The sand storage bin will be served by a 25-ton crane and conveyors and prepared sand will be delivered to the ramming building by a pneumatic conveyor. It is expected castings will have improved soundness and surface through accelerated cooling rate and lack of interference with solidification.—*Robert Love*

Connecticut Non-Ferrous

A DISCUSSION of "Zircon Sand and Its Application in the Foundry" featured the Sept. 16 meeting of the Connecticut Non-Ferrous Foundrymen's Association. The meeting was held at the Shuttle Meadow Club in New Britain, Conn., and the speaker was John R. Lewis, development engineer, Titanium Alloy Mfg. Division, National Lead Co.

The speaker stated zircon sand is zirconium silicate and is obtained in rather pure form by costly processing. It is finding increased use in the foundry because of its high fusion point, 4000° F, and its resistance to metal wetting. Another advantage is its chilling effect which is about one-third that of iron.

Zircon sand is being used for chilling heavy sections to promote directional solidification and to eliminate heavy risers. In flour form, the sand is used as a filler to lower permeability and increase refractoriness. Other applications include mold washes, a paste for coating metal chills, permanent molds, skimmers, thermocouple tips, crucibles, ladles, runners, spouts and also as patching material for furnace linings. Zircon sand also can be used for sand blasting.—*John V. McCarthy, North American Smelting Co.*

Tennessee

ANNUAL outing of Tennessee Chapter of the AFS was held at Camp Columbus on the shores of Lake Chickamauga near Chattanooga on Sept. 12. Approximately 600 members and guests were on hand to enjoy the outing. It was arranged by Ed S. Williams, Ingersoll-Rand Co., general chairman of the

(*Continued on page* 224)

TENNESSEE Chapter of the AFS held its annual picnic Sept. 12 at Camp Columbus, near Chattanooga, on the shores of Lake Chickamauga. Left to right, top, are Chapter Chairman W. P. Delaney, Eureka Foundry Co.; T. A. Johnson, Somerville Iron Works; and E. S. Williams, Ingersoll-Rand Co. At bottom, left to right, are William Marks, Crane Co.; Porter Warner Jr., Porter Warner Industries; Jim Minner, Birmingham Chapter visitor; Charlie Chisholm, Wheland Co.; Hal Roach, Laclede-Christy Co.; and an interested group surveying the prizes scheduled to be given away later in the afternoon

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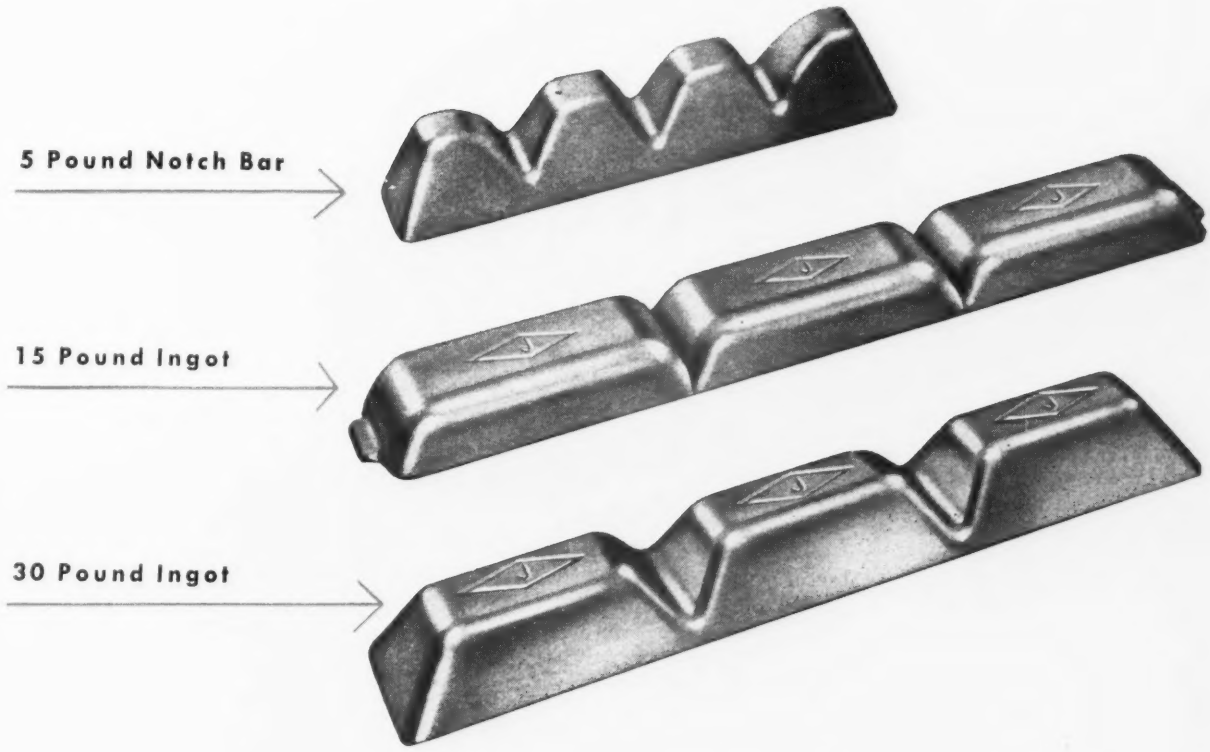

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AURORA, ILLINOIS

TEXAS Chapter of the AFS met Sept. 25 at the Menger Hotel in San Antonio, Tex. Feature of the meeting was a panel of experts who discussed foundry problems. Left to right are Harold Judson, Kincaid-Osburn Electric Steel Co.; John Kimes, Lufkin Foundry & Machine Co.; P. B. Croom, Houston Pattern Works; M. W. Williams, Industrial Foundry Co.; C. H. McGrail, Hewitt-McGrail Co.; John Bird, American Brass Co.; Walter Temple, Kincaid-Osburn Electric Steel Co.; and C. E. Silver, Texas Electric Steel Casting Co.

(*Continued from page* 222)

affair, and his able assistant T. A. Johnson, general manager of Somerville Iron Works, who headed the food and drink sub-committee. Among the guests were 27 from the Birmingham Chapter of AFS.— *W. F. Hetzler, Eureka Foundry Co.*

Wisconsin

A GROUP of sectional meetings was arranged for the opening meeting of Wisconsin Chapter of the AFS, held Sept. 11 at Hotel Wisconsin, Milwaukee.

The malleable group had as its speaker John A. Meyer, a consultant in industrial supervision in the Milwaukee area, whose topic was "Supervision Is My Line," with N. Amrhein, Federal Malleable, as chairman. "Ways of Reducing Scrap in the Foundry" was the topic of Casey Kotowitz, Lawran Foundry, Milwaukee. C. Van Buren of the same company served as chairman.

The pattern group heard Martin Ehrman Jr., International Harvester Co., who discussed "Gating and Risering of Cast Iron," with William Parana, Waukesha Foundry, a second speaker covering the subject for nonferrous metals. H. W. Stokes, Waukesha Foundry Co., was chairman for the group.

"Practical Aspects of Carbon Control in the Cupola" was covered by A. J. Dublo, Sterling Foundry Co., Wellington, O., who spoke before the gray iron group. H. W. Schwengel, Modern Equipment Co. was chairman.

A number of the members attended the session at which O. Jay Myers, Archer-Daniels-Midland Co., Minneapolis, described the "D" process of shell molding. David Zuege, Sivyer Steel Casting Co., Milwaukee, served as chairman. Mr. Myers exhibited two interesting shells. One was a heavy crankshaft and the other a mold with a number of pieces on one plate.

Highlights of the information Mr. Myers related included the fact that fine dry sand is necessary for satisfactory results with the process. Fly ash is used to prevent stickiness and oil is used as binder with no cereal or water in the mix. The shells exhibited were blown at 90 lb. No liquid parting should be used since it dissolves the oil binder and the sand must be clean. Cores used are harder and stronger than ordinary mixtures. Advantages of the process include the fact no special equipment is necessary and there are no hot patterns to handle.—*John E. Hubel*

New England

FIRST meeting for the new season of the New England Foundrymen's Association was designated Past Presidents' night. Meeting was held Sept. 9 at the University Club and 145 members were present. The past presidents who were in attendance were applauded warmly as they were introduced.

Featured speaker at the meeting was Ray Olson, Production Pattern Foundry Co., Chicopee, Mass., who presented an enlightening talk on "Shell Molding," with illustrating slides. The interest of the group in the subject was emphasized by the lengthy question period which concluded the meeting.—*Alexander Beck, Whitman Foundry Inc.*

Philadelphia

NOVEMBER meeting of Philadelphia Chapter of the AFS will be held at the Engineers Club, on Nov. 13. Dinner is scheduled for 6:30 and the technical program will begin at 8 p.m. J. L. Stevens, sand technician

(*Continued on page* 226)

NEW ENGLAND FOUNDRYMEN'S ASSOCIATION held its first fall meeting Sept. 7, which was past president's night. Left to right, back row, are Joseph B. Stazinski, General Electric Corp.; A. W. Calder, Builders Iron Foundry; Walter Saunders, metallurgist, Providence, R. I.; Frank Elliot, Westinghouse Corp.; Robert Walker, Whitin Machine Co.; Fred Shaw, Bettinger Enamel Corp.; A. S. Wright, Springfield Facing Co.; and Frederick Fitzgerald, Draper Corp. Front, left to right, are Leroy Sherwin, Brown & Sharpe Mfg. Co.; Norman Russell, retired; E. H. Ballard, retired; H. S. Chaffee, Builders Iron Foundry; Charles Miller, Fairmount Foundry; and Arthur Dockery, Putnam Co.

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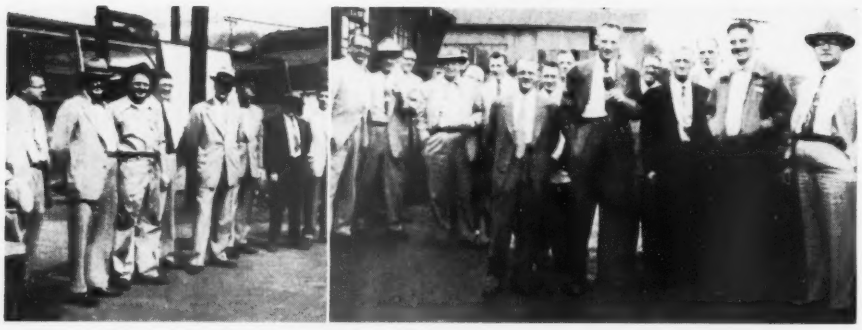

CHESAPEAKE Chapter of the AFS toured the plants of the Glamorgan Pipe & Foundry Co. and of Lynchburg Foundry Co., both of Lynchburg, Va., during September. Some of the members who made the tour are shown above, at the Glamorgan plant on the left and at the Lynchburg plant on the right. Photographs are by Lewis H. Gross, American Radiator & Standard Sanitary Corp.

(*Continued from page 224*)

for Bethlehem Steel Co., Bethlehem, Pa., will speak on "Sand." Clyde Jenni, chief metallurgist, General Steel Castings Co., will be technical chairman.

The chapter will hold a Christmas party in December and the technical programs will resume on Jan. 15, at which time C. V. Nass, vice president, Beardsley & Piper Division of Pettibone Mulliken Co., Chicago, will discuss "Mechanization in Coremaking and Molding." Motion pictures will also be a feature of the presentation that he will make on that occasion. —*C. R. Sweeney, Atlantic Steel Castings Co.*

Chesapeake

A VISIT to Lynchburg, Va., was arranged for members of Chesapeake Chapter of the AFS as the first meeting of the year. Approximately 100 foundrymen made the trip on Sept. 25.

The morning was spent touring the Glamorgan Pipe & Foundry Co. where the group was greeted by Frank G. Carrington, vice president. An interesting practice observed was a steel shelled cupola operating without a refractory lining in the melting zone. The exterior of the shell was cooled by a flowing stream of water. The visitors saw pressure pipe centrifugally cast in a water-cooled, steel mold. A visit to the sand mold foundries where large pipe fittings are cast completed the tour.

After lunch the visitors were met at Lynchburg Foundry by H. W. Campbell, plant manager. Special points of interest were the pilot shell molding plant where molding machines were in operation; processing of ductile iron; and the loop molding lines where a variety of castings are produced.

With Glamorgan and Lynchburg foundries as hosts, a cocktail party preceded the dinner at the Virginian Hotel. A technical meeting followed during which a discussion of the operations and practices observed was held. Tom W. Curry, Lynchburg Foundry Co., was in charge of program arrangements for the day.

For its Nov. 27 meeting, Chesapeake Chapter has planned a panel discussion of foundry topics to be held at the Engineers Club, Baltimore. The discussion group includes: C. A. Roebeck, Gibson & Kirk Co., Baltimore, nonferrous; Eugene H. Ryer, J. J. Lacy Foundry, Baltimore, gray iron; Jack C. Schaum, metallurgy division, Bureau of Standards, Washington, steel.—*Lewis H. Gross, American Radiator & Standard Sanitary Corp.*

SOUTHERN CALIFORNIA Chapter of the AFS opened its 1953-54 season with a meeting which was addressed by William N. Davis, director of the Safety, Hygiene and Air Pollution Program of the AFS. From left to right are Chapter President Hubert Chappie, National Supply Co.; William C. Baud, Mechanical Foundries Division; J. William Mitchell, Utility Steel Foundry; Paul Crow, Phillips Foundry; Charles R. Gregg, Gregg Iron Foundry; and Mr. Davis, the speaker. Photographs are by K. F. Sheckler, Calmo Engineering Co.

Mo-Kan

OPENING meeting of the current chapter season for Mo-Kan Chapter of the AFS was held at the Fairfax Airport dining room. It was unusually well attended by members and guests. F. H. Kobely, Columbia-Geneva Steel Division of U. S. Steel Corp., presented a fine talk on "Safety Through Objective Analysis."—*C. W. Boettcher, Black, Sivalls & Bryson Inc.*

Southern California

SUPPORT Your Chapter" was the theme of the opening meeting for Southern California Chapter of the AFS at its meeting held Sept. 11. Approximately 150 members and guests met at the Rodger Young Auditorium, Los Angeles, and were greeted by Hubert Chappie, National Supply Co., chapter chairman.

Program chairman Charles R. Gregg, Gregg Iron Foundry, introduced William N. Davis, director of Safety, Hygiene and Air Pollution of the AFS, Chicago, who discussed safety and accident prevention in the foundry. He believes management and operating personnel must take an active part in planning and enforcing a safety program.—*Otto H. Rosentreter, National Engineering Co.*

Northeastern Ohio

OPENING the 1953-54 chapter year, the Northeastern Ohio Chapter of AFS met Sept. 10 at the Tudor Arms Hotel, Cleveland, with more than 200 members and guests in attendance. Immediate past president Frank Cech, Cleveland Trade School, was presented a plaque by the chapter in appreciation of his fine work during his term of office last year, and the presentation was made by the new president, Steven E. Kelly, Eberhard Mfg. Co., Cleveland.

An interesting coffee talk was delivered by R. C. Clark, Ohio Bell Telephone Co., who discussed radio and television and the part the Bell System has played in their development. His talk was accompanied by some amazing equipment, and in conclusion Mr. Clark pointed out that such developmental research is possible only under our free enterprise system.

Technical speaker was Karl G. Presser, assistant director, Gray Iron Research Institute, Columbus, O.

(*Continued on page 228*)

Photo courtesy of Reading Chamber of Commerce

R E A D I N G

FOUNDRY MARKET AREA NUMBER ELEVEN

With a total of 11,480 employees and an annual production of some 418,000 tons of castings, Reading is second among the leading foundry market areas in the eastern section of the country. There are 78 foundries in the Reading area, 18 of which employ 100 or more people—one of them over 2500. A good percentage of the area's 47 gray iron foundries keep cleaning costs to a minimum by using ANNEALSHOT and or SUPER-ANNEALSHOT. You'd be able to cut cleaning costs, too, by changing over to these efficient abrasives. Call in your Metal Blast representative or write direct to **METAL BLAST, Inc.**, 872 East 67th St., Cleveland 3, Ohio.

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ANNEALSHOT
chilled shot and grit
SUPER-ANNEALSHOT
malleable shot and grit

NORTHWESTERN PENNSYLVANIA Chapter of the AFS held its first event of the 1953-54 season on Sept. 28. Left to right are Bailey Herrington, Hickman, Williams & Co.; G. A. Pealer, General Electric Co., Elmira, N. Y.; and Charles Gottschalk, Cascade Foundry

(*Continued from page* 226)

whose subject was "What Quality Control Means to a Foundry Foreman." Mr. Presser paid tribute to the value of quality control systems, noted the worth of quality control card systems and discussed the benefits that can accrue from their use. However, he stressed the great importance of the human element in quality control.

The best planned system must have the support and understanding of foremen and supervisors before it can function effectively, he said. Only through such understanding can the system be made to work at its fundamental point, the production employee.

Two guest speakers were featured at the Oct. 8 meeting of Northeastern Ohio Chapter of the AFS. Meeting at Tudor Arms Hotel, 250 members and guests assembled to hear Harry E. Gravlin, production manager, Dearborn Iron Foundry, Ford Motor Co., Dearborn, Mich., and Frank W. Story, chief of the Cleveland Police Department.

Chief Story discussed the organization and equipment of the Cleveland Police Department and pointed out that the major crime rate has fallen in Cleveland although it is on the rise both in other cities of the same size and in the nation as a whole.

Mr. Gravlin's topic was "Sand . . . Metal . . . or Men." He displayed defective castings furnished by members of the chapter, pointed out and described the defects and invited foundrymen in the audience to state their opinions about the causes and about how they could have been avoided.

Mr. Gravlin's purpose was to indicate how opinions about a given defect would vary and to point out that any plant can take advantage of the experience of employees in all its sections in the analysis of defective castings.—*Jack C. Miske*

Twin City

ALL PAST chairmen of Twin City Chapter of the AFS were present at the group's Sept. 15 meeting. O. Jay Myers, Archer-Daniels-Midland Co., chapter chairman, presented each with a gavel on which his name and the dates of his term of office were engraved.

A description of the recently announced high-pressure molding method was presented by Tom Barlow, sales manager of Eastern Clay Products Division, International Minerals & Chemicals Co. While it was pointed out the process is still in its experimental stage, its purpose is to provide closer tolerances than can be attained through conventional molding methods. Basis for successful high pressure molding is a dry, flowable sand which is obtained by coating a 90-grain fineness four-screen sand with liquid resin, dry resin and clay in the presence of heat.

The sand's flowability eliminates riddling or screening since the lumps flow as well as free sand. Mold surface hardness is achieved at 600 psi molding pressures, and this factor represents the secret of the improved tolerances. Hydraulic pressure in excess of 200 psi is necessary to hold tolerances within the desired limits.

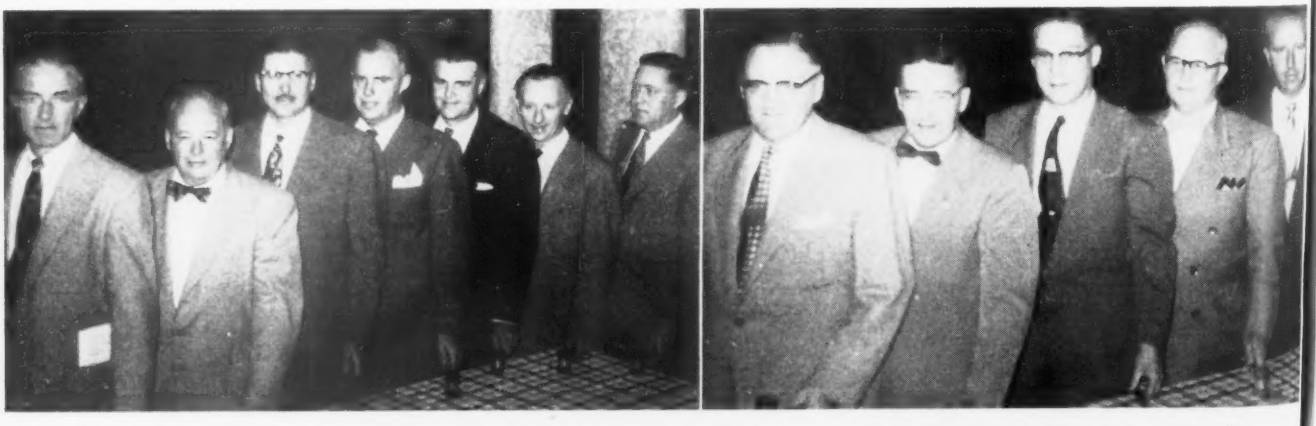
Mr. Barlow concluded by pointing out that the process' true value will not be realized until actual production operations are attempted.—*R. J. Mulligan, Archer-Daniels-Midland Co.*

Northwestern Pennsylvania

THE current chapter year was opened by Northwestern Pennsylvania Chapter of the AFS on Sept. 28 with a dinner meeting at the Erie Moose Club. Charles Gottschalk, Cascade Foundry, and chapter chairman, reviewed briefly the activities planned for the coming year and introduced Robert Johnson, Bucyrus-Erie Co., who outlined the "Gray Iron Metallurgy and Cupola Operations" course which the chapter is sponsoring.

Principal speaker was G. A. Pealer, General Electric Co., Elmira, N. Y., who discussed "Pattern Engineering for Better Castings," and who was introduced by Bailey Herrington.

(*Continued on page* 230)



TWIN CITY Chapter of the AFS honored its past presidents by presenting each with a gavel at the Sept. 15 meeting. Left to right are E. C. Madson, Anderson Corp.; R. M. Aker, Western Alloyed Steel Castings; C. H. Anderson, Crown Iron Works; R. C. Wood, Minneapolis Electric Steel Castings Co.; H. M. Patton, American Hoist & Derrick Co.; S. P. Pufahl, Commutator Co.; C. C. Hitchcock, R. C. Hitchcock & Sons Inc.; F. A. Austin, Crown Iron Works; S. L. Cameron Jr., Valley Iron Works; C. F. Quest, J. F. Quest Foundry; J. W. Costello, American Hoist & Derrick Co.; and Jay Myers, the Archer-Daniels-Midland Co. D. B. Fulton, Northern Malleable Iron Co., accepted the gavel which would have gone to his father, the late A. M. Fulton. Photos by R. J. Mulligan, Archer-Daniels-Midland

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Let air power's tireless muscles do the heavy work in your foundry. Let *compressed air* be the force that lifts heavy castings . . . that puts molds where you want them . . . that opens or shuts chutes for molding sand . . . or numerous other applications.

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(*Continued from page 228*)
Hickman, Williams & Co. Mr. Pealer reviewed the history of the industry and then described engineering of patterns to reduce the over-all cost of castings. Roy A. Loder, Erie Malleable Iron Co. was discussion leader. —*Roy A. Loder, Erie Malleable Iron Co.*

Canton

OPENING the current chapter year on Oct. 1, Canton District Chapter of the AFS met at the Mergus Restaurant, Canton, O. There were 88 members and guests present to hear Chester V. Nass, vice president, Beardsley & Piper Division, Pettibone Mulliken Corp., Chicago, speak on "Mechanization in Core Making."

He emphasized that any foundry, regardless of size, type or quantities of castings produced, can mechanize profitably to some degree. Alfred S. Morgan, Babcock & Wilcox Co., introduced Mr. Nass.

Robert A. Epps, Stoller Chemical Co., chairman of the chapter, presented awards for service to the chapter during the past year to Anton Dorfmueller Jr., Thiem Products Co., and Alexander Prentice, Stark Foundry Co.—*R. R. Kozinski, Canton Malleable Iron Co.*

Rochester

A COMBINATION clam feast and barbecue picnic attracted 350 members and guests of Rochester Chapter of the AFS on Sept. 19. Held at Barnards Exempts, those present

ROCHESTER Chapter of the AFS began its 1953-54 activities with a combination clam feast and barbecue picnic. Left to right are Charles D. Loomis, secretary, and Neil Clement, president of Rochester Chapter

were entertained with food, beverages and many games, the feature being a greased pig race. After many attempts by the 50 contestants, the pig was finally stopped.

Credit for the success of the season's first activity is due Paul C. Buschner, entertainment committee chairman and general chairman of the picnic arrangements.—*H. G. Stellwagen, Hetzler Foundries*

Central New York

TO open the current chapter year, Central New York Chapter of the AFS met Sept. 11 at Twin Ponds Country Club outside Utica, N. Y., with John A. Feola, Crouse-Hinds Co., Syracuse, N. Y., chairman of the chapter presiding. New officers and directors of the group were introduced.

Donald L. Lavelle, research department of American Smelting & Refining Co., Barber, N. J., was guest speaker and he was introduced by Robert Watson, Chicago Pneumatic Tool Co., Utica, N. Y.

Mr. Lavelle spoke on "Foundry Practice Aluminum Sand Casting Defects—Their Identification, Causes and Corrections." He illustrated with slides the more common defects such as misruns, sand explosions, sand lines or rattails, sand buckling, scabs, soft ram, sand holes, rough surfaces, inclusions, blows, shrinkage, cracks resulting from shrinkage or cold quenching following heat treatment, and internal porosity.—*Bruce R. Artz, Pangborn Corp.*

St. Louis

ATTENDANCE at the Sept. 10 meeting of St. Louis District Chapter of the AFS was spurred to 150 through advance announcement

CHICAGO: Examining castings at the Oct. 5 meeting, left to right, are J. J. Eiben of Ford Motor Co.; Robert L. Doelman of Miller & Co., and Harry E. Gravlin of Ford Motor Co., principal speaker. Photo is by Fred Ridenour, Whiting Corp.

that a symposium on shell molding would be held.

Chairman Webb L. Kammerer, Midvale Mining & Mfg. Co., opened the discussion with a review of shell molding and pointed out some of the early developments which have led to the process' present status in the industry.

Walter Sokolosky, foundry service engineer, Monsanto Chemical Co., Springfield, Mass., discussed various resin binders available and their use with coated and semi-coated sands. E. B. Henby, research engineer, National Engineering Co., Chicago, covered the subject of mulling methods and mulling time; W. C. May, sales engineer, Dow Corning Corp., Midland, Mich., described release agents and the reasons for using them as well as the types available.

Arthur Krato, president, Tyler

(*Continued on page 233*)

CENTRAL MICHIGAN Chapter of the AFS met Sept. 22, when members and guests opened the new year by hearing Palmer Coombs, plant manager, Bendix Aviation Products Division, Bendix Corp., South Bend, Ind. Left to right are Mr. Coombs; Arthur Ruppe, Bendix Corp.; and Chapter Chairman John Wolf, Midwest Foundry Co. At the right, some members are observing core molds for Air Force jet airplane carburetors

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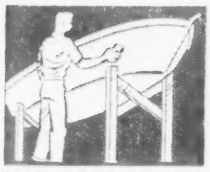
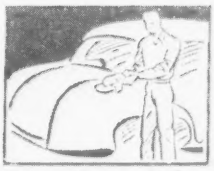
REVOLUTIONARY DISCOVERY... "HEARD 'ROUND THE WORLD"!

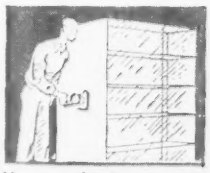
The world-wide demand for our latest abrasive development, GRITCLOTH, has already forced us to increase our production capacity. Right now we are keeping abreast of the still growing clamor for this most advanced sanding material.
GRITCLOTH gives the removed particles a place to go and thereby maintains fast cutting action throughout its amazingly long life.
For machine and hand sanding or polishing . . . wet or dry . . . it's GRITCLOTH. Order now!



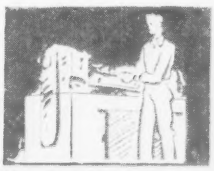
Excellent for fast, smooth rubbing of prime coats on all boat and marine finishes. Extra-long life whether you use GRITCLOTH wet or dry.



Outstanding results from leading car manufacturers using GRITCLOTH for wet prime-coat sanding. BOTH SIDES OF GRITCLOTH are used, for maximum life.



New production speeds in all metal fabrication finishing and deburring. Less down-time means more production and less cost with GRITCLOTH.



Non-loading feature gives GRITCLOTH tremendous advantages in speed and amount of material removed. GRITCLOTH saves you money on machine or hand polishing.

★ 10 to 15 TIMES LONGER LIFE than the conventional types of coated abrasives.

★ APPLICATIONS ARE LIMITLESS . . . each day finds a new successful operation for this Miracle Modern Sanding Fabric.

★ NON-LOADING... OPEN MESH LETS THE REMOVED PARTICLES FLOW RIGHT THROUGH.

★ THOUSANDS OF SUPER-SHARP EDGES KEEP ON CUTTING.

★ USE WET OR DRY

★ FLAT OR FOLDED

★ BY MACHINE OR HAND

★ BOTH SIDES

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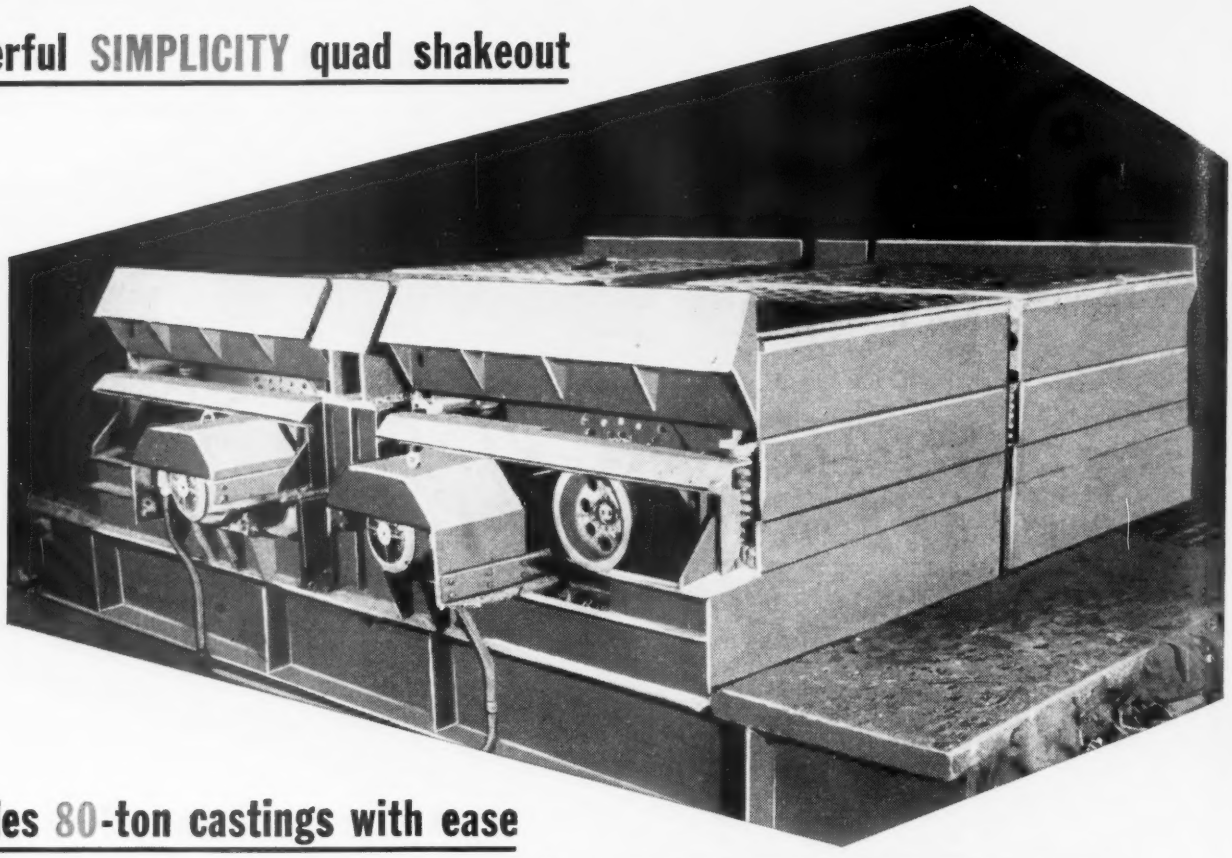
Powerful SIMPLICITY quad shakeout

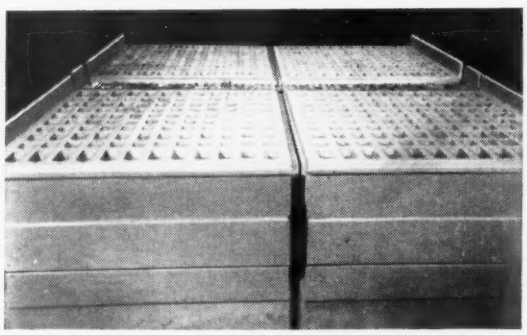


handles 80-ton castings with ease

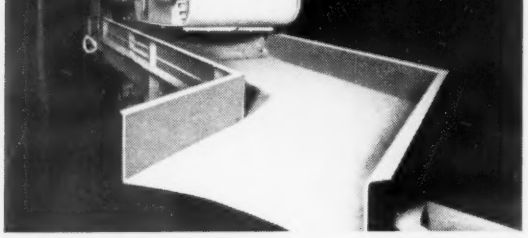
This is the Simplicity spring-mounted quad shakeout, made up of four 7′ x 8′ steel-decked Simplicity Model OM units, that is handling huge 80-ton tank hull castings for a well-known foundry.

After plenty of pounding by the big 80-ton castings, the deck of the Simplicity unit is still in sound condition. Controlled vertical vibration, concentrated at the deck, eliminates travel of flasks and castings and does a more thorough shakeout job in less time.

In the same foundry, a 4′ x 20′ Model OA Simplicity Feeder, installed under a hopper beneath the shakeout, feeds sand to the return conveyor for reclaiming without hang-up or bridging in the hopper.



This 3′ x 20′ Simplicity Model VS Conveyor, connected to the Simplicity Feeder, insures the smooth, even flow of sand back to the reclaiming unit. It is equipped with a Dings self-cleaning magnetic separator that removes all metal particles from the sand.



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Sales representatives in all parts of the U.S.A.
FOR CANADA: Canadian Bridge Engineering Company Ltd., Walkerville, Ontario
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Simplicity
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ENGINEERING COMPANY • DURAND, MICHIGAN

(*Continued from page* 230)

Metal Products Co., St. Louis, reviewed shell molding machines on the market, their differences, advantages and disadvantages, while Robert Kenyon, foundry manager, Lewin-Mathes Co., St. Louis, presented his

ST. LOUIS Chapter of the AFS met Sept. 10, when six speakers conducted a symposium on shell molding. Walter Sokolosky, Monsanto Chemical Co., Springfield, Mass., discussed resin binders used in the process

views on the operating aspects of the process with emphasis on the cost differential between shell molding and conventional methods. In conclusion, E. R. Belton, president, Progressive Pattern Co., St. Louis, summarized pattern equipment available. The meeting ended with a question-and-answer period.

The following have been appointed committee chairmen for the coming year: Program, Fred J. Boeneker, Bronze Alloys Co.; Entertainment, John O'Meara, Banner Iron Works; Apprentice Training, Dale Arnette, Arnette Pattern Co.; Membership, Walter A. Zeis, Walter A. Zeis Co.; Auditing, W. C. Pickles, American Brake Shoe Co., National Bearing Division; Reception, R. E. Hard, St. Louis Coke & Foundry Supply Co.; Education, A. L. Hunt, American Brake Shoe Co., National Bearing Division; Publicity, J. R. Bodine Jr., Bodine Pattern & Foundry Co.—*J. R. Bodine Jr., Bodine Pattern & Foundry Co.*

Central Michigan

SEVENTY-FIVE members and guests came to order as Chairman John Wolf, Midwest Foundry Co., Coldwater, Mich., pounded the gavel at the kick-off meeting of Central Michigan Chapter of the AFS, Sept. 22, at the Kalamazoo Country Club, Kalamazoo, Mich.

Palmer Coombs, plant manager, Bendix Aviation Products Div., Bendix Corp., South Bend, Ind., discussed and showed slides on aluminum and magnesium foundry practice as it pertains to the aviation industry. Mr. Coombs stated that his foundry originated as a gray iron shop and remained so until 1939. Presently it is all aluminum and magnesium, employs 175 people and the Air Force is its most important customer. His slides showed carburetors from pre-World War II to some of the more recent jets, and he exhibited core assemblies and castings.—*Bob Dodge, Archer-Daniels-Midland Co.*

Chicago

CHICAGO Chapter, AFS, initiated its 1953-54 series of meetings Oct. 5 at the Chicago Bar Association with its "Management Night" program. With Harry E. Gravlin, production manager, Dearborn Iron Foundry, Ford Motor Co., Dearborn, Mich., presenting his widely-acclaimed

Beat Up Hoppers Cost You Time and Money!

GET FREE-FLOWING, NON-STICKING SAND FROM ANY MIX

With

MABCO Release Agent "G"

At Last M. A. Bell Company has developed a sure-fire method of freeing sticky core and molding sand in your hoppers. Only one-quarter pound of MABCO Release Agent "G" is required to eliminate stickiness in 100 pounds of sand.

Fine For Blowing Cores Made With Synthetic Binders

One-half pound of MABCO Release Agent "G" with 100 pounds of core sand will allow you to strip cores cleanly from box with no rapping.

Write today for free Bulletin RA250 giving full details on how you can try the amazing MABCO Release Agent "G" in your foundry at no risk to you.

M. A. BELL COMPANY
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"Serving the foundry industry for over 25 years"
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demonstration — "Sand, Metal or Men?" — attendance was over 200.

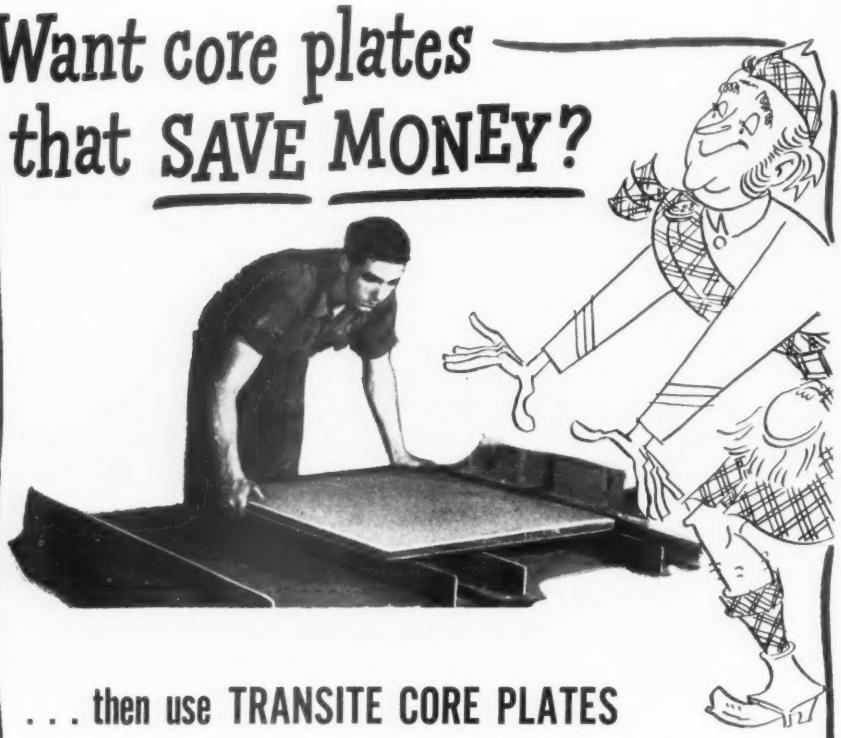
Chapter President John A. Rassenfoss, assistant research director, American Steel Foundries, presided at the general portion of the meeting. Deming H. Lucas, sales representative, Pittsburgh Metals Purifying Co., and membership committee chairman, reported on activities since spring.

Robert L. Doelman, chapter vice president, and sales engineer, Miller & Co., was technical chairman and introduced Mr. Gravlin. The latter's technique of getting the audience to participate in a free-for-all discussion of the causes of defects in castings on display is too well known and has been too frequently reported in FOUNDRY to repeat here.

Suffice it so say, however, that Mr. Gravlin burns up a lot of energy and wears out some shoe leather in demonstrating how foundries should get people together in conference for purpose of drawing upon accumulated experience in analyzing for the probable cause of recurring defects in castings. Such analysis will show that the trouble is traceable to sand, metal or men, or some combination of the three. The speaker commented facetiously that the "third shift" isn't always to blame.

The chapter's Nov. 2 meeting will feature the first in the series of roundtables. The malleable, gray iron and nonferrous divisions will combine their efforts on a discussion of core sand mixtures. Pattern division will consider wood selection and the steel and maintenance divisions will join to look into cleaning equipment.— *Erle F. Ross*

Want core plates that SAVE MONEY?



. . . then use TRANSITE CORE PLATES for easy handling, low maintenance, long life!

You get real long term economy with Transite* Core Plates. Their initial cost is low . . . and their maintenance cost negligible. Transite Core Plates are tough and corrosion-resistant. They are made from an asbestos and cement composition by a special Johns-Manville process. They resist shock and corrosion . . . will not crack or break easily.

Here are other important reasons for using Transite Core Plates:

THEY SPEED PRODUCTION— Transite Core Plates are easily handled. They're simple to clean, too, since core wash, sand, etc. do not adhere to them as readily as to other core plate materials.

THEY MAINTAIN ACCURACY— Foundrymen who have used Transite Core Plates for years report minimum warpage.

For cores of large mass and small surface area, perforated Transite Core Plates are also available to eliminate green cores and reduce baking time. For full details, write Johns-Manville, Box 60, New York 16, New York.

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Made of Asbestos

Furnace Makers Advise Defense Department

Recommendations as to government-owned industrial heating equipment suited to lay away for defense and as to the means of preserving and protecting such equipment have been presented to the Department of Defense by the Industrial Furnace Manufacturers Association Inc.

A committee from the association headed by William Adam Jr., Ajax Electric Co., Philadelphia, met with representatives of the Mill Practices Committee of the Department of Defense, headed by Kenneth E. Joy. Members of the association committee included C. H. Vaughan, Electric Furnace Co., Salem, O.; L. A. Shea, Lindberg Engineering Co., Chicago; R. T. Cadwell, Holcroft & Co., Detroit; and Carl L. Ipsen, Industrial Furnace Manufacturers Association Inc.

Baker-Raulang Celebrates 100th Anniversary

Baker-Raulang Co., Cleveland, pioneer materials handling equipment manufacturer, is celebrating its 100th anniversary this year. The company had its beginning in 1853 when German immigrant Jacob Rauch opened his one-man wagon repair shop on Cleveland's west side.

Twenty-five years later, Mr. Rauch took in Charles Lang as his partner, and the Rauch & Lang Carriage Co. was formed. In 1915, that organization merged with the Baker Motor Vehicle Co., which had been formed by Walter C. Baker, also of Cleveland, who had worked in 1898 with Thomas A. Edison to develop one of America's first electric automobiles.

During World War I, however, the new company, Baker-Raulang, formed by merger of Rauch & Lang and Baker, began to produce industrial trucks and tractors for the military at government request, and never returned to automotive manufacture. Since 1917 it has concentrated exclusively on powered handling equipment for industry.

FOR A *Quick* SURFACE-METAL SET . . .

DELTA Z-KOAT and Z-Z-KOAT

CORE AND MOLD WASHES

Contain ZIRCONIUM

DELTA Z-KOAT and Z-Z-KOAT Washes are easy to mix and easier to apply. After mixing, there is no danger of precipitation and, when dry, are completely moisture-proof. Applied by swabbing, dipping or brushing they adhere uniformly to the sand and produce smooth, highly-refractory surfaces.

Both DELTA Z-KOAT and Z-Z-KOAT Washes have unusually high fusion points and, because of their high heat conductivity, provide a more rapid surface-metal set. Both washes are economical to use.

DELTA Z-KOAT contains zirconium plus other high fusion refractories and

DELTA Z-Z-KOAT is an all-zirconium type wash.

Working samples together with instructions available on request.

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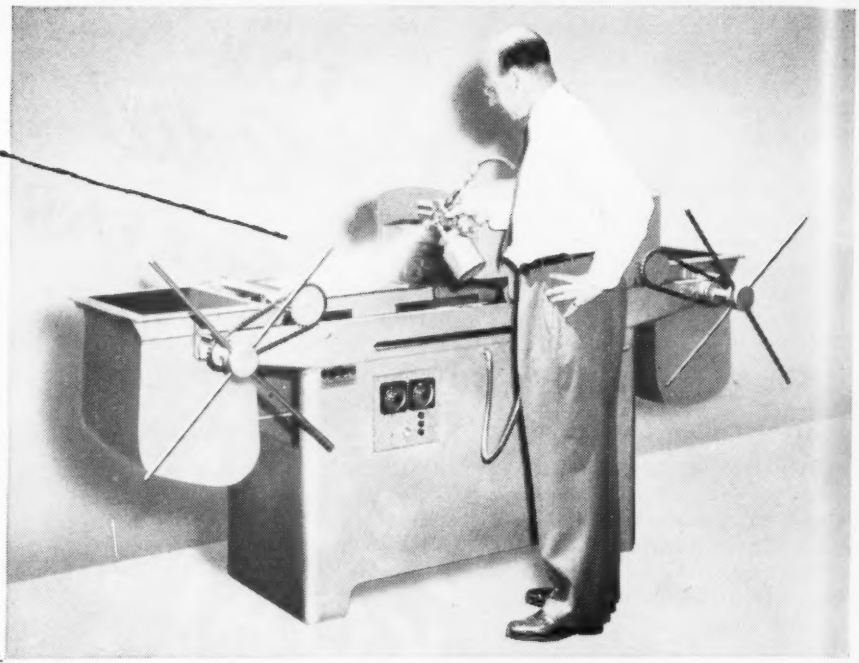
MANUFACTURERS OF SCIENTIFICALLY CONTROLLED FOUNDRY PRODUCTS

SIMPLIFY SHELL MOLDING



President Frank K. Shallenberger of the Shalco Engineering Corp., Palo Alto, Cal., applying Dow Corning 8 Emulsion to one of the two patterns on his company's machine. Twin dump boxes and a rolling oven-and-stripper assembly permit two patterns to be used at once in alternating cycles. Cope and drag production are automatically balanced. Compensating springs and geared capstans help rotate pattern and box in one continuous operation. Capacity is in the range of one 14" x 18" shell every 30 seconds.

use

DOW CORNING 8 EMULSION

. . . the NEW Silicone Parting Agent that gives you clean, positive release of shell molds and cores at lowest cost

You'll save money and minimize your production problems by specifying Dow Corning 8 Emulsion to assure fast, clean release of shell molds. This noncorrosive, nonflammable silicone emulsion cannot break down at molding temperatures to leave a carbonaceous build-up on even the most complex pattern surfaces. That reduces pattern cleaning costs to a minimum; gives you faster, more continuous production of uniformly accurate shells. And that enables you to give your customers all they have learned to expect of the shell process: uniform castings that require a minimum amount of machining.

Dow Corning 8 Emulsion can be easily diluted with hard or soft water to any desired concentration. It is highly resistant to creaming or separating in storage or after dilution. And it is available at a new low price, 8% below that of previous emulsions. For more information and a free trial sample, call the branch office nearest you or fill out and mail this coupon today.

Send for sample TODAY

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Please send me ☐ Free sample of Dow Corning 8 Emulsion
☐ Data on Silicone Release Agents for the Shell Process

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In Canada: Fiberglas Canada Ltd., Toronto

In Great Britain: Midland Silicones Ltd., London

National Foundry Meeting

(*Concluded from page* 156)

are double the average for the industry; prices of the company's products have been reduced, and a relatively high return has been paid stockholders. An important by-product of the feeling of satisfaction developed among employees by the incentive system has been the development of latent talents in the individuals through their increased interest in their jobs.

The association's Resolutions Committee, headed by Herman Menck, Harnischfeger Corp., Milwaukee, presented resolutions expressing the organization's views on four subjects. These approved government action on anti-recession plans; gave preference to state authority rather than federal in occupational safety laws and regulations; approved full use of technical and mechanical improvements and plans which reward employees in proportion to their contributions toward greater productivity; and expressed recommendations on various proposed amendments to the Taft-Hartley Act.

All officers of the association were re-elected for the coming year. They are: President, W. Summerfield Brunk, Headford Bros. & Hitchins Foundry Co., Waterloo, Iowa; vice president, W. W. C. Ball, the Taylor & Fenn Co., Hartford, Conn.; treasurer, Frank J. Sherwin, Chicago Hardware Foundry Co., North Chicago, Ill. Charles T. Sheehan was reappointed executive secretary.

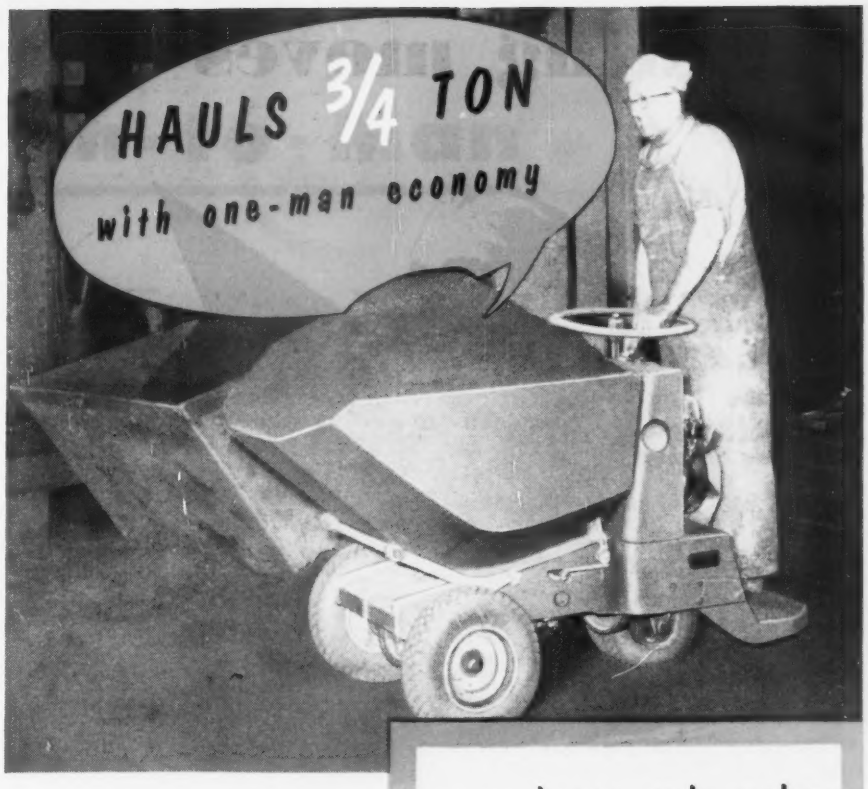
Members of the executive committee, in addition to Messrs. Brunk, Ball and Menck, include Paul Arnold, United States Pipe & Foundry Co., Chattanooga, Tenn., and A. V. Martens, Pekin Foundry & Mfg. Co., Pekin, Ill.

A preconvention highlight was the Alumni banquet and presentation of bronze plaques to past presidents of the association in recognition of their services to the organization. Those honored and the years of their terms as president included:

Thomas W. Pangborn—1933-1936, Franklin R. Hoadley—1936-1939, William D. Hamerstadt—1939-1942, Herman Menck—1944-1946, I. Richards Wagner—1946-1948, Franklin Farrel III—1948-49, Harry E. Ladwig—1949-50, A. V. Martens—1950-1952.

Correction

In the article "Coke Quality and Carbon Pickup" presented in the October issue, the ash content for the by-product coke designated as "e" was shown on page 117 as 0.2 per cent. This should read 9.2 per cent.



Shuttling between mixers and molding stations, and from shake-out floor to cleaning room and storage, Kwik-Mix Moto-Bug moves ¾-ton loads with one-man material-handling economy. As a power wheelbarrow, this low-cost foundry handyman hauls coke, core and molding sand . . . cleans up slag and scrap around ovens, shops and yards. Change to flat-bed platform, or 5-ft. fork lift, and Moto-Bug handles flasks, cores, finished castings. Check the *big savings* you can earn with a *small investment* in Moto-Bug. See Kwik-Mix distributor for a demonstration, or write us.

saves heavy work, makes man-hours more productive

- **Moto-Bug carries up to 10 cu. ft. (struck) in gravity-dump hopper**
- **takes ¾-ton load up 20% ramp (75% loaded weight on drive tires)**
- **clears 33-inch aisles, doorways; turning radius is only 61 inches**
- **backs up by power, reverse is instantaneous . . . no push, no pull**
- **3.6-to-1 gear ratio on positive steer reduces operating effort.**
- **standard-make 6 h.p. gas engine, automotive-type differential**
- **optional: riding step, muffler, zero-pressure dual drive tires**
- **interchangeable ¾-ton platform, ½-ton (5-ft.) fork lift, scraper**

Mail to: KWIK-MIX CO. 3029 W. Concordia, Milwaukee 16, Wis.

Send us full details on Moto-Bug with:

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KWIK-MIX (Koehring Subsidiary) "NO PUSH — NO PULL" **Moto-Bug**

"nothing moves but the sand"

Brady Cloth Bag Filter installed on the Powell Plant roof. Mounted on a "Brady Metal" cyclone section. Sand conveyed is quite dry, so this unit is used to control fine sand particles.

A BRADY FLO-VEYOR SYSTEM is solid, permanent and well established. Like the monuments of Egypt, it remains constant while the sand alone moves. Conveyor lines are made of steel piping, but all bends and turns are cast of our hard wear resistant iron "Brady Metal" for long life and low maintenance cost. A Brady pneumatic conveyor system saves labor, is self-cleaning, dustless, goes through or around obstructions, and moves heavy tonnage hourly at small cost per ton.

The Brady "FLO-VEYOR" Sand Handling System installed recently at the William Powell Company Plant in Cincinnati includes a Brady Cloth Bag Filter with automatic shaking mechanism to clean the bags. Plant compressed air moves the unprepared core-sand through the pipes in a matter of seconds, and delivers it where required. There are no moving parts to the "FLO-VEYOR"; truly, nothing moves but the sand.

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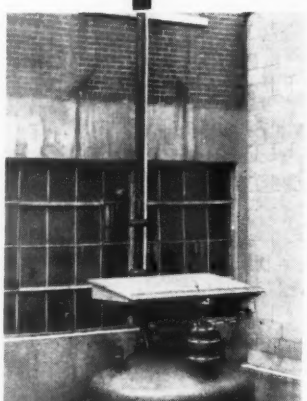

"FLO-VEYOR" pressure vessel at the Powell Plant. A pressure reducing valve is used to effect sand conveyance at lowest air pressure practicable.

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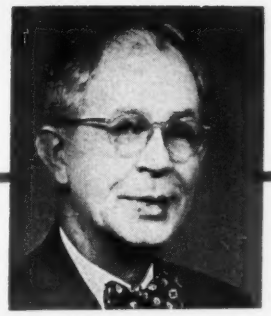


Man-to-Man

By RALPH L. LEE

Tragic Promotions

"One of the worst tricks that can be played on a person is to promote him to a position for which he is fundamentally unfit"

THE more I see of groups of people working together, and the more I think about what I've seen, the more firmly I am convinced that one of the lowest of all the cruel and lowdown tricks that can be played on a person is to promote him to a position for which he is fundamentally and naturally unfit.

One of the dearest friends I have ever had was made chief engineer of a concern which later grew to international fame. The owners of this budding business, in appreciation of a gang which sweat blood, pulled rabbits out of hats and worked night and day to get the product ready for the market and into production, passed out promotions to supervisory and management posts as though they were gold cups and merit awards.

This friend of mine, who became chief engineer, knew every nut and bolt of the apparatus forward and backward. He remembered in exact detail the history of every change that had been made during the whole development period, who suggested the changes, who made them and all of the troubles involved. He was one of the most persistent and relentless checker-uppers I ever met in my life, and he was a working fool. But the odd thing was that while he had an engineering degree, he was not mechanically inclined; in fact, he had one heck of a time getting a new problem or development through his head.

This was a handicap of no mean proportions, but, knowing of this lack himself, and knowing that everyone else who dealt with him soon caught onto it also, he assumed a permanent defensive against everyone. Without fully realizing it, he got the goat of practically every one on first contact with him, mine included. After a while those who had to work with him discovered his blind side as far as dealing with people was concerned and tried at least to make allowances for his blunders.

But in spite of all this, his bosses, out of steadfast loyalty for his original sweat and blood, kept him on the job until things finally blew up completely and they had to get rid of him. The product had begun to slip alarmingly.

In my recollection, my friend never before had been struck such a blow. All he lived for was his job, and he reveled in the delight of wearing the badge of his position and in having the associations his job made possible. He canvassed the whole water front for another job like it and failed to hold several trial posts. Finally he went completely to pot, both physically and mentally.

The Best of Intentions—The diabolical thing about this episode was that the powers who made this horrible mistake did so with the most noble intentions. Since this experience, I shudder whenever I hear of an appointment being made in the following fashion.

"Well, Fred, I don't know whether we are making a prize boner or being smart, but we've had our eye on you for quite a spell. We've decided to take a flier with you. Beginning Monday morning we want you to take charge of the department. Now we're going to give you lots of rope. See that you don't hang yourself. It'll be up to you. You're getting the opportunity of a lifetime."

If the appointment is solely a gamble, then there's a fifty-fifty chance that a crime is being committed. The family of the appointee soon takes up the slack in the increased pay. He moves into a new circle of associates in the plant, and he also moves into a new position in his own estimation of himself.

If this fellow tries to measure up as he has never tried before, works harder and for longer hours than he has ever worked before, but in spite of it finds that he simply does not have what it takes to lead and direct others, he faces mental and emotional bankruptcy.

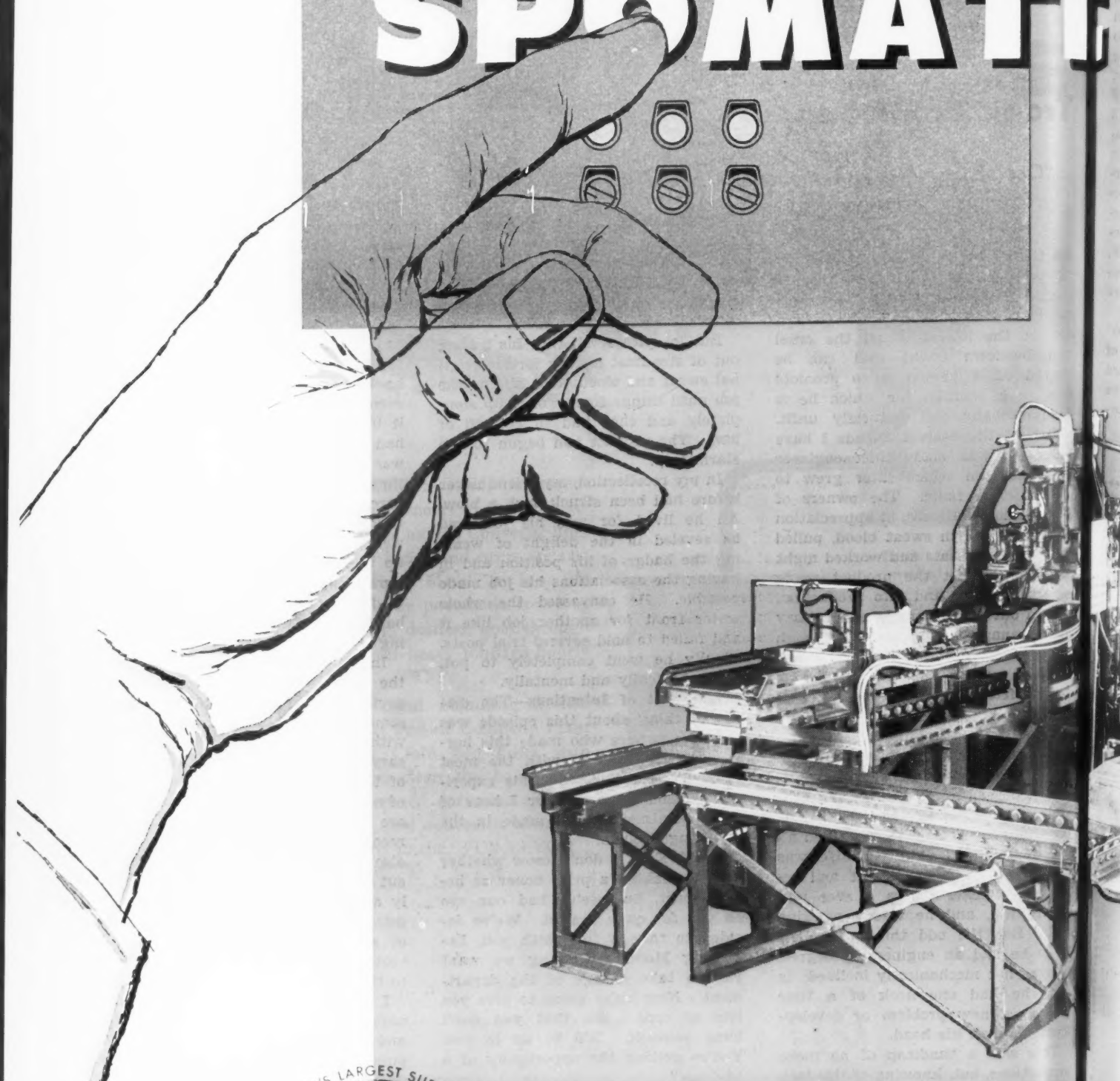
No matter how short the service on his new post, he can't go back feeling the same way he did before; he looks upon himself as a failure even though he might try to cover it up by blaming it on others who had it in for him. The real failure was not his but those who thought they had a right to gamble with the careers of others as a means of getting themselves out of a hole—or were misled into thinking that steps up the supervisory or management pyramid were primarily prizes or medals to be handed out on the basis of loyal seniority or outstanding effort.

In my opinion, success in directing the efforts of others requires a peculiar and distinct talent which some are born with and others born without. It's a talent just as necessary to leadership as another kind of talent is to virtuosity in the field of music. It's a fact that some people are born with a talent for music, recognizable even in infants. It is also a fact that, although those without this talent can learn to play fairly acceptably after years of dogged determination and hours and hours of gruelling practice, the effort invested is clearly out of proportion to the final results.

I feel quite certain that if all the untalented foremen, superintendents and even managers were suddenly pulled out of our foundries, the industry would soon have to shut down. There doesn't seem to be much prospect of the day coming when only talented people will fill these posts, but we certainly can work in that direction with little or no gamble that the gains we make will pay dividends in proportion to the effort.

(Concluded on page 242)

SPOMATIC



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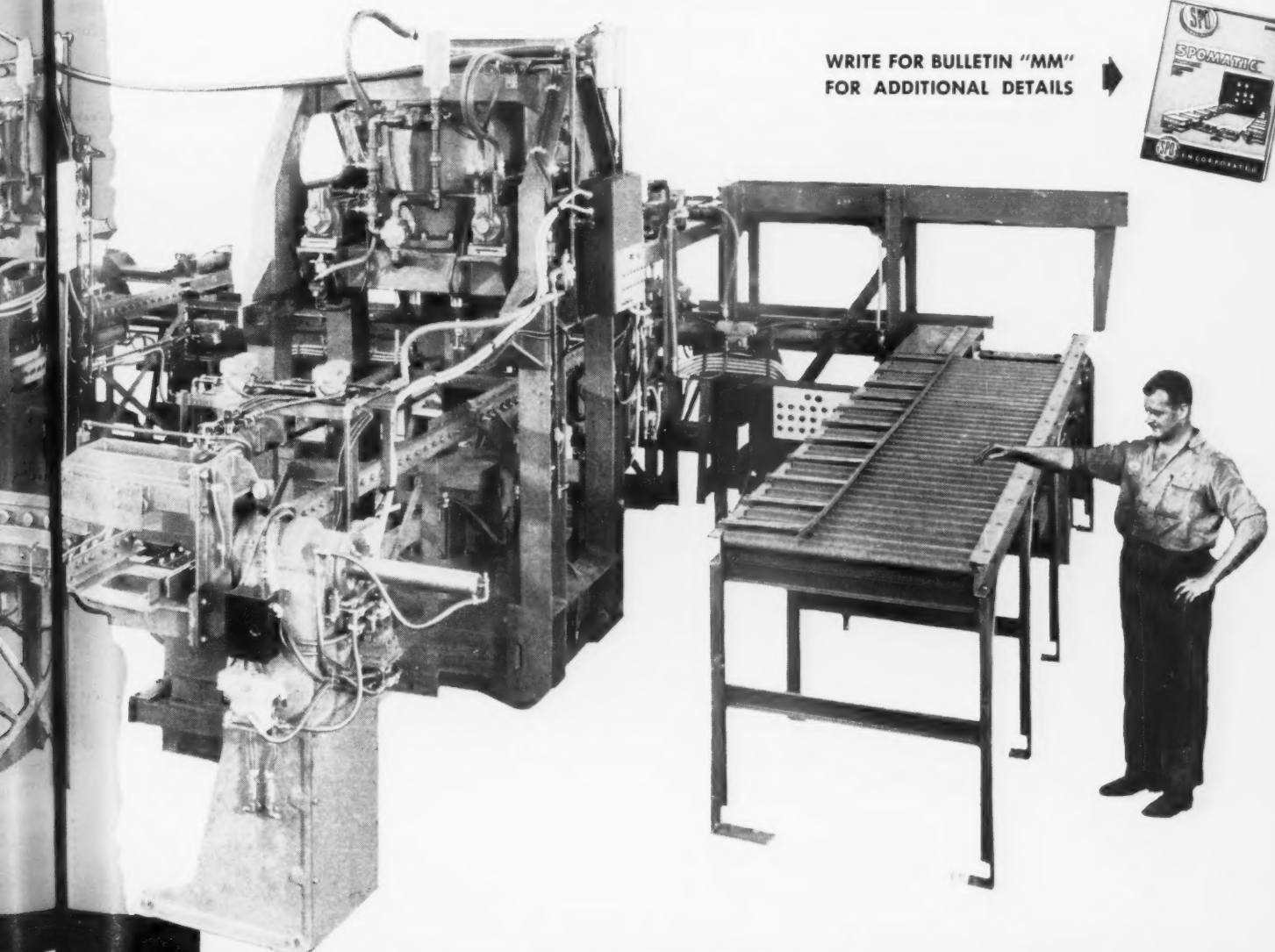


SPOMATIC . . . HEART OF THE AUTOMATIC FOUNDRY

(*Concluded from page* 239)

Leadership Is a Profession—I can no longer dodge the conviction that supervision or leadership is a distinct profession, separate from the technicalities of the field in which it is employed. Instance after instance of talented leaders, who couldn't tell a cope from a drag but were able to put a department or organization back on its feet, seem to prove that this is true.

Supervisory training, now widespread all over the country in most industries, certainly proves the vital importance of this profession, but if, as I suspect, a particular talent is an indespensable requirement for success in this profession, we might well take some of the training effort and apply it to methods of sifting out the talented from the untalented before training begins.

As a result of looking for clues to leadership talent for the past fifteen years, I have discoverd that people with this talent leave a trail of unmistakable signs behind them, signs which are recognizable if we are on the lookout for them, but are passed unnoticed if our minds are on other things. In the next issue of the good old FOUNDRY, God and weather permitting, I'd like to share with you my prized collection of *signs of leadership*.

Heat Treatment of Steel

(*Continued from page* 127)

the several curves is shown in the diagram at the top in Fig. 10. Point (1) on the left-hand curve, as indicated in the upper chart, is the point at which the first indication of the presence of ferrite and pearlite is found. Point (2) represents the transformation of half the remanent austenite, and point (3) the time and temperature required for transformation to be completed. Other points on the curves are located in a similar manner.

In Fig. 10 Ae_3 is the A_3 equilibrium line and Ae_1 is the A_1 line, of the carbon-iron diagram. The letters *A*, *F* and *C* represent austenite, ferrite and cementite. The curved lines indicate the time at any given temperature required for the separation of ferrite to begin, and for the transformation of austenite to begin and end. Below about 900° F, the line of the beginning of ferrite separation and that of the transformation of austenite to pearlite join to form a single curve.

In the case of the steel represented by the diagram of Fig. 10, if the specimen is held at 1300° F, ferrite begins to separate in about 20 minutes, but no pearlite will be formed, regardless of the holding time. When held at 1150° F, ferrite starts to separate in some 7 seconds, pearlite begins to form in about 300 seconds, and transformation will be complete in about 8000 seconds (2 hours, 13 minutes). At 900° F, ferrite separation and pearlite formation begin in a little over ½-second, and transformation is complete in about 60 seconds. At lower temperatures, the beginning and end of transformation occur after longer holding, at 700° F, for instance, it starts in about 3 seconds and is complete in a little over 500 seconds (8⅓ minutes).

At temperatures below about 450° F, the line marking the beginning of transformation curves back toward the ordinate. This portion of the curve indicates the beginning of transfor-

(*Continued on page* 244)

How To Do It . . .

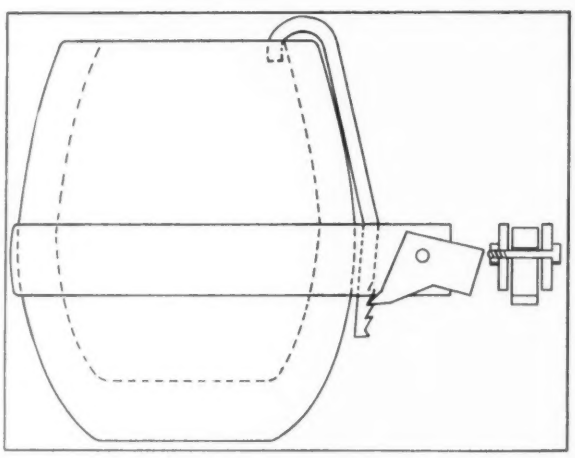
Handy Clamp Holds Crucible Safely in Pouring Shank

By PAT DWYER
Engineering Editor

NEW CRUCIBLES sit high in the pouring shank. The crucible is made with a low bilge to allow for the wear and reduction in diameter caused by erosion and abrasion of the surface by flame, fuel, tongs, etc. To prevent the crucible from slipping or falling out of the shank during the pouring period, an extra man holds it in place with a bar or hook, or some kind of a holding device is employed. The simple, positive-acting device shown in the accompanying illustration is used in a prominent midwestern nonferrous foundry.

The device, with only two moving parts, requires little effort and time to attach or detach it from the crucible. One part is a hook bar with rack teeth along the lower part of the back face. The teeth may be cut or molded, whichever is the more convenient. The dog which engages the teeth has an overhang which forces the point of the dog against the rack. The hole through the dog may be cored in a casting or drilled near the end opposite to the overhang. Two fittings of bar stock are shaped to fit the shank. They may be bolted or welded in place. These fittings carry the dog and also provide a guide for the lower end of the hook bar. The hook bar and dog may be cast in the foundry from any metal—iron, steel, brass, bronze or even copper. When they are worn out they may be returned to the furnace with the remainder of the scrap charge.

In service the hook bar is dropped into the guide where the dog automatically holds it in place by engaging a tooth in the rack. After the crucible is emptied of its contents the overhanging part of the dog is lifted and the bar easily is removed for further use.



Do you have any tricks of the trade tucked away with your foundry experience? Why not release them to fellow foundrymen? FOUNDRY will pay a minimum of $10 for each idea submitted and published. Send a photo or drawing with your idea

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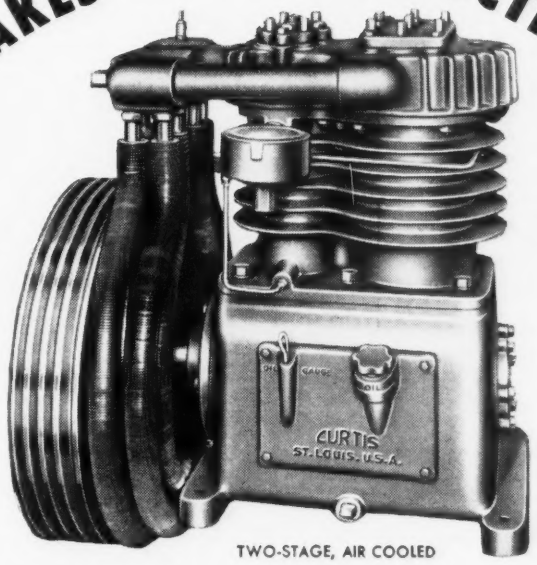

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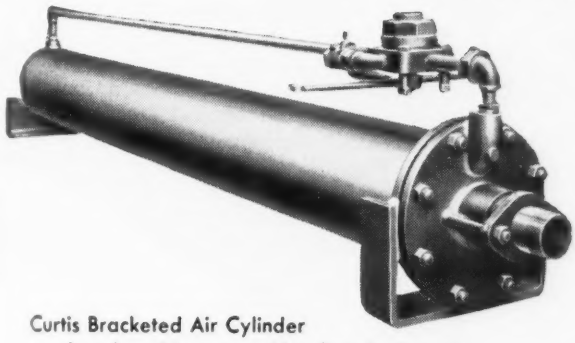
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(*Continued from page* 242)

mation to martensite, and in many instances its location cannot be determined as accurately as that of the portions of the curves lying at higher temperatures.

It is apparent from an examination of the S-curves, that when steel has been cooled slowly from above the critical temperature range, transformation is complete once the time and temperature representing the end of transformation have been reached, and no further change in structure will occur if the piece is then cooled rapidly to atmospheric temperature. In other words, once the right-hand line of the S-curve has been passed, castings being annealed by slow cooling may be removed from the furnace and allowed to cool in the air.

When castings of very uneven section are so handled, however, cooling stresses will be set up in them which may sometimes result in warpage during machining. To prevent this, it may be necessary to interrupt the air cooling by returning the castings to the furnace, or by placing them in an enclosed hood or burying them in lime or hot ashes, so that in the final stages, cooling will be quite slow. By noting the temperature to which the castings have cooled, and the time consumed in reaching that temperature, one can know when the right-hand curve has been crossed, and accelerated cooling may begin.

Isothermal Heat Treatment

As a result of the development of the S-curves, treatments have been devised and applied to certain types of rolled or forged steel, in which the pieces are heated above the critical temperature range, transferred to baths of molten lead or salts, held at temperature for varying lengths of time, and then cooled in air. In fact, for many years certain types of steel wire have been subjected to a process known as "patenting," which closely resembles some of the more recently invented treatments. "Austempering" and "martempering" are the best known instances of the use of this "isothermal" heat treatment. So far however, the use of these methods is confined almost entirely to rolled or forged steels of very light section, and castings usually are treated by continuous cooling from above the transformation temperature range.

The type of ferrite and the ferrite-pearlite grain size that is formed in the steel depends upon the rate at which it is cooled after heating above the transformation temperature range, and therefore the temperature at which transformation takes place. This is illustrated graphically in Fig.

(*Continued on page* 246)

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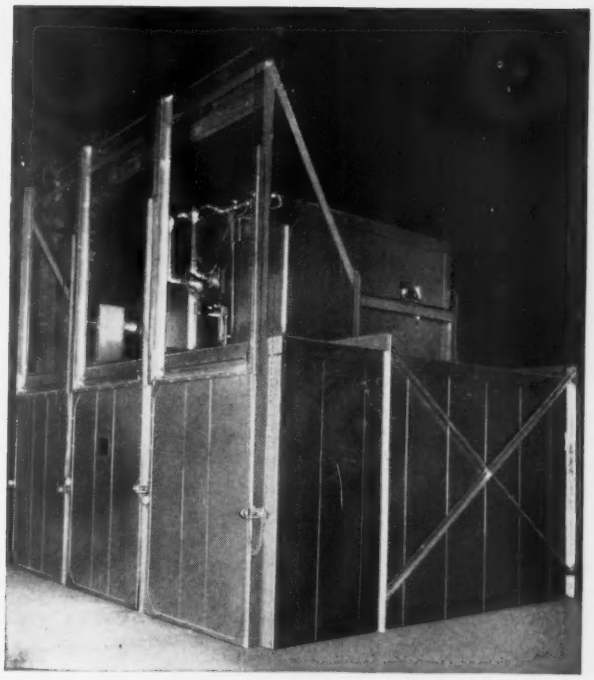

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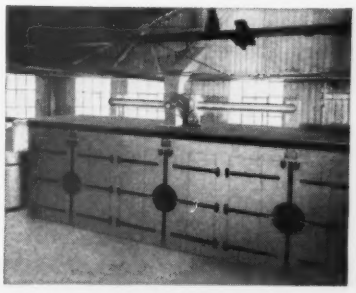

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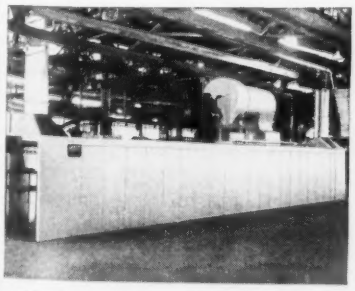

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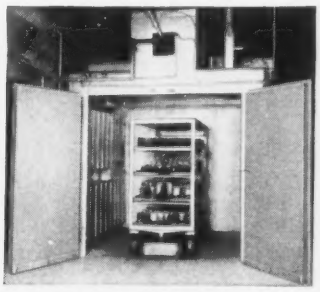

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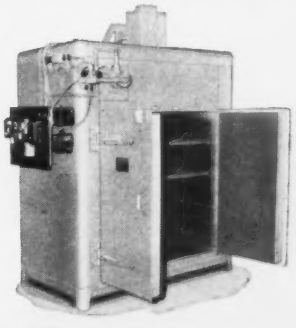

Shelf Type Core Oven

(*Continued from page* 244)

11, in which a number of different cooling rate curves are superimposed upon a portion of the S-curve of the steel in question. At the bottom of the chart are shown the types of microstructure that result from cooling the steel at these varying rates. The left-hand cooling curve represents the extremely rapid rate obtained by water quenching a specimen ½-in. thick, which gives this steel an entirely martensitic structure.

The second curve is that obtained by cooling a similar specimen in still air. The resulting microstructure is a quite fine mixture of Widmanstaetten ferrite and pearlite. A small piece cooled in powdered asbestos (third curve), shows partly Widmanstaetten ferrite and partly the grain-boundary type of block ferrite, plus pearlite. The still slower cooling of the fourth curve produced a similar structure, but with coarser ferrite-pearlite distribution, and the fifth rate resulted in a structure in which grain-boundary blocky ferrite has been replaced by the coarse blocky type.

The really slow cooling represented by the sixth curve produced very coarse ferrite, arranged in a dendritic pattern caused by remanent inhomogeneity, similar to that found in as-cast specimens. This dendritic pattern has been found to occur more readily and at a lower temperature of transformation, in specimens of cast steel cooled uninterruptedly from above the transformation zone, than in those transformed isothermally. This tendency to the formation of a dendritic ferrite-pearlite pattern was noticeable in many of the micros shown in the author's early papers.

The coarseness of the dendritic ferrite pattern resulting from slow cooling necessarily depends upon the size of the original dendrites formed as the steel solidified. As a rule, therefore, the pattern will be coarser in heavy sections—since they necessarily solidify and cool very slowly—than in comparatively thin pieces. In fact, specimens cut from very heavy castings and examined at 100 diameters will sometimes have so coarse a dendritic pattern that it may not be recognized as such, because only parts of the ferrite network appear in the field of view.

The shape and location of S-curves varies considerably with the composition of the steel, and with certain other factors. In particular, an increase of alloy or phosphorus content shifts all the curves to the right. As a result, remanent inhomogeneity in a steel, by shifting the curves of the higher phosphorus areas in this way, causes transformation to begin at higher temperatures in the purer cores of the original dendrites than in the enriched interdendritic spaces. For this reason, in most cast steels more than one type and arrangement of the ferrite will be found to occur in any given small area. This residual inhomogeneity, too, is the cause of the reappearance of a dendritic pattern in the ferrite when the steel is cooled very slowly from above the transformation range.

When accelerated cooling is used, the outside layers of any but a very heavy piece of steel necessarily cool faster and transform at a lower temperature than the interior. The microstructure of a moderately thick piece having the composition of the steel in Fig. 11, after an air cooling, will therefore vary from fine Widmanstaetten ferrite and pearlite at the outside, to coarser blocky ferrite and possibly even dendritic ferrite and pearlite, at the center. Obviously, too, when a heavy section of the same composition is withdrawn from the furnace it will cool so much slower than a light one that it may nowhere have a really fine ferrite-pearlite distribution, but instead will resemble in appearance the fourth or fifth micrographs of Fig. 11.

Alloy Moves Curve Position

Figs. 10 and 11 are characteristic of steels that contain enough alloy to bring their S-curves entirely into the zone above a minimum time of ½-second, so that what is called the "knee" of the curve at about 900° F lies to the right of the ordinate. In plain medium-carbon steels, however, the S-curves are of the type shown in Fig. 12, in which only the portion representing the end of transformation lies entirely to the right of an ordinate of 1 second.

The other two curves cross the ordinate at temperatures around 1200° F—in other words, below that temperature liberation of ferrite and transformation of austenite begin too quickly to be measured accurately. In these steels, therefore, even very rapid cooling will not prevent the separation of some ferrite and the transformation of part of the austenite to pearlite. If cooled in less than 3 seconds, however, the cooling curve will lie to the left of the curve representing the end of transformation, so that a certain amount of austenite will be retained, and will transform to martensite at lower temperature.

For all practical purposes, however, it is plain that at commercially possible cooling rates this steel will be completely transformed to ferrite and pearlite at temperatures above 1100 or even 1200° F. Variations in the rate of cooling, therefore, will be found to affect only the type of ferrite and the ferrite-pearlite arrangement produced. From examination of the S-curve, it is plain that quite rapid cooling rates will produce in these steels, structures similar t

(*Concluded on page* 248)

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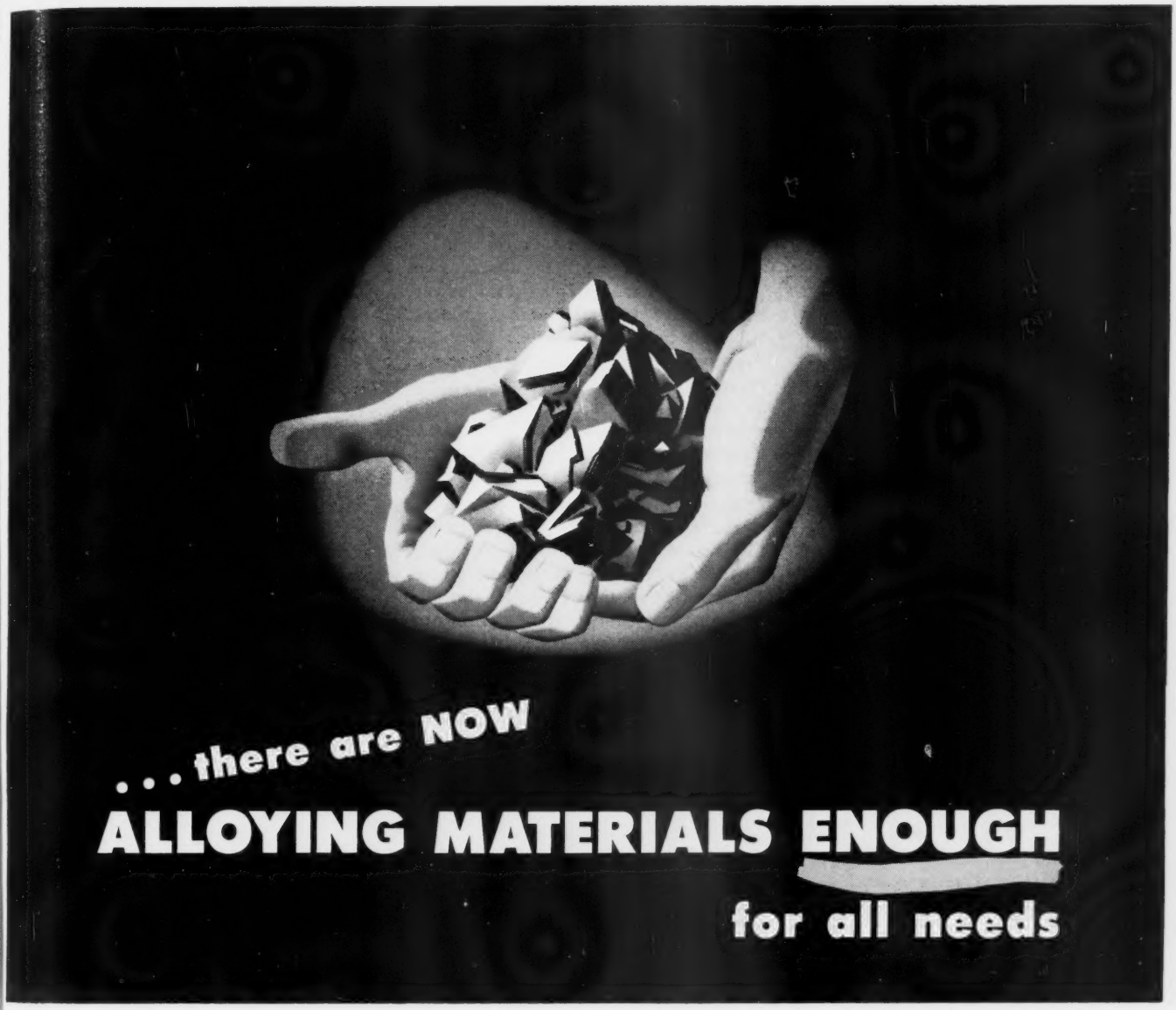

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Subsidiary: Cleveland Tungsten, Inc., Cleveland *Plants:* Washington, Pa., York, Pa.

MCA

(*Concluded from page 246*)

those found in low alloy steels cooled somewhat more slowly. Air cooling would result in a structure like that of the third micrograph in Fig. 11, instead of the second, asbestos cooling would give the structure of the fourth instead of the third, and the dendritic ferrite-pearlite pattern of the sixth micrograph would appear after a faster rate of cooling than that which gave this structure in the steel of Fig. 11. In other words, in the absence of alloy content, a steel must be cooled much faster, to obtain a given type of structure, than is required for an alloy steel.

This variation in the types of structure produced in different steel by changes in the rate of cooling is a reflection of differences in their "hardenability," due to changes in chemical composition. As mentioned above, when a piece of steel is cooled fast enough to give it a completely martensitic structure, its hardness will vary directly with the carbon content, the hardness being a function of the carbon only. Fig. 13 shows the variations in the maximum attainable hardness in steels of different carbon content, quenched to 100 per cent martensite.

Hardenability, however, is not the same thing as hardness, but is a measure of *how far below the surface* the highest attainable hardness is produced, when the steel is quenched—that is, the depth to which the piece hardens. This is not a function of carbon content. For example, if two 1-in. round bars of carbon steel containing, respectively, 0.30 and 0.70 per cent C are quenched from above the transformation temperature into iced brine, their hardness at the surface will be about 55 Rockwell C for the first, and 65 Rockwell C for the latter. In both bars, however, this hardness will extend only to a depth of about ¼-in. below the surface. The two steels, then, differ in attainable hardness, but have the same *hardenability*. The addition of alloys, and variations in initial grain size, cause marked changes in the hardenability of a steel of given carbon content, but not in the maximum hardness that can be produced in it by quenching.

The rate at which a piece of steel cools, when immersed in oil, water or air, varies directly with its thickness, so that even at the surface, the cooling rate of a heavy section will be much slower than that of a thin one. When the steel has a low hardenability, the knee of the S-curve lies so close to the ordinate that even when quenched in cold water, the cooling curve of the surface of a heavy piece will intersect the S-curve at high temperature. As a result, only a little martensite will be formed, and the hardness will be correspondingly low.

At the center, of course, the cooling rate and the hardness will be still lower. On the other hand, when the hardenability of the steel is high, so that the S-curve is shifted to the right, the slower cooling rate of the larger sections is still fast enough to make the cooling curve pass to the left of the knee of the S-curve, so that much more martensite is formed and the hardness will be nearer that of a thin piece quenched in the same medium. This is illustrated in Figs. 15 and 16 which show the variations in hardness of bars of various sizes quenched in water and in oil. In each figure the left-hand plot represents a steel of low hardenability, containing 0.45 per cent C and no alloy, the right hand one a steel of high hardenability containing 0.40 per cent C, 1 per cent Cr and 0.20 per cent Mo.

The lower hardenability of the plain carbon steel is reflected in the marked decrease in hardness from outside to center of the small bars, and in the very low hardness of all parts of the larger ones, when quenched in water. When quenched in oil, the cooling rate is much lower, and the difference in rate between surface and center is much less pronounced. This is reflected in the lower hardness secured in the bars of all sizes, and in the smaller difference in the hardness at outside and center. In the steel of high hardenability, on the other hand, the surface hardness of a 4-in. bar quenched in water is nearly as high as that of the 1-in. piece, and a 2-in. bar cooled in oil has a surface hardness but little below that of the water-quenched 1-in. bar.

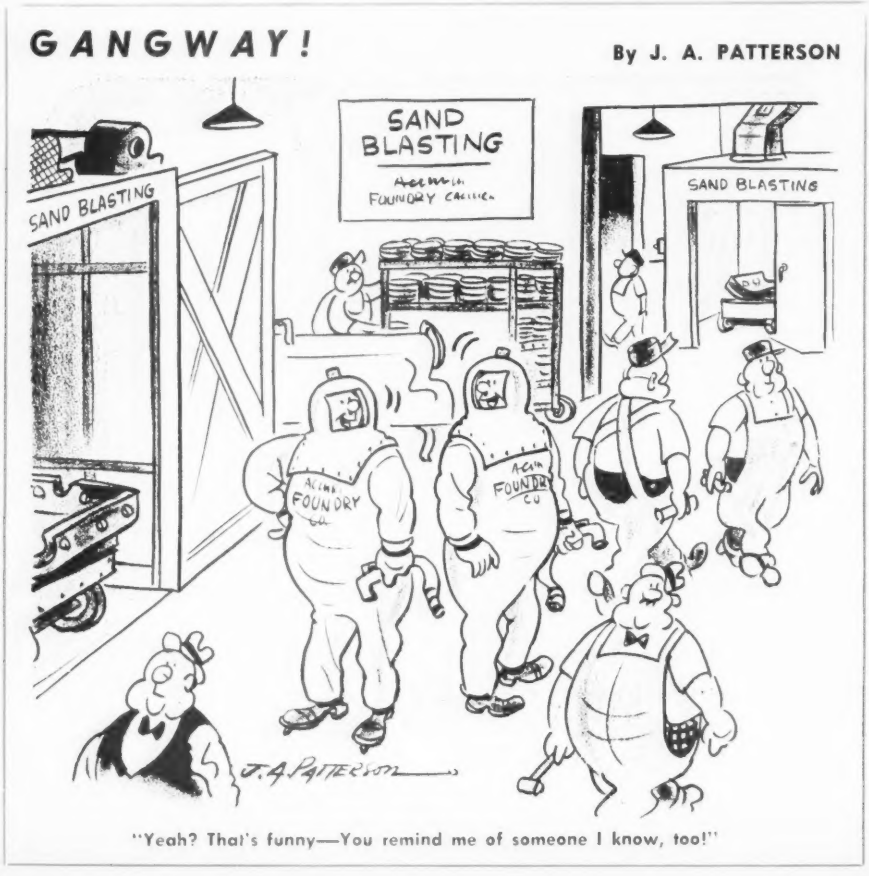
The difference in hardness from outside to center of the water quenched piece is also smaller than in the plain carbon steel. When cooled in air, the difference in cooling rate between outside and center of heavy pieces is quite small, as shown in Fig. 14, which shows the cooling curves from the center and the outside of a cylinder 12 in. in diameter, cooled in air.

(*To be concluded next month*)

References

4. "Heat Treatment of Hypoeutectoid Carbon Steel Castings," by John Howe Hall. *Proceedings*, American Society for Testing Materials. Vol. IX. 1913. page 370.

5. *The Steel Foundry*, by John Howe Hall. page 232.



Organize New Foundry in Sheboygan

Sheboygan Castings Corp. has been organized in Sheboygan, Wis., with Harry Rogers as general manager. Gray iron foundry, operated in Sheboygan by Cherry-Burrell Corp., Chicago, was acquired by the new company for production of castings. Cherry-Burrell had operated the foundry separate from manufacture of its milk bottle filling equipment

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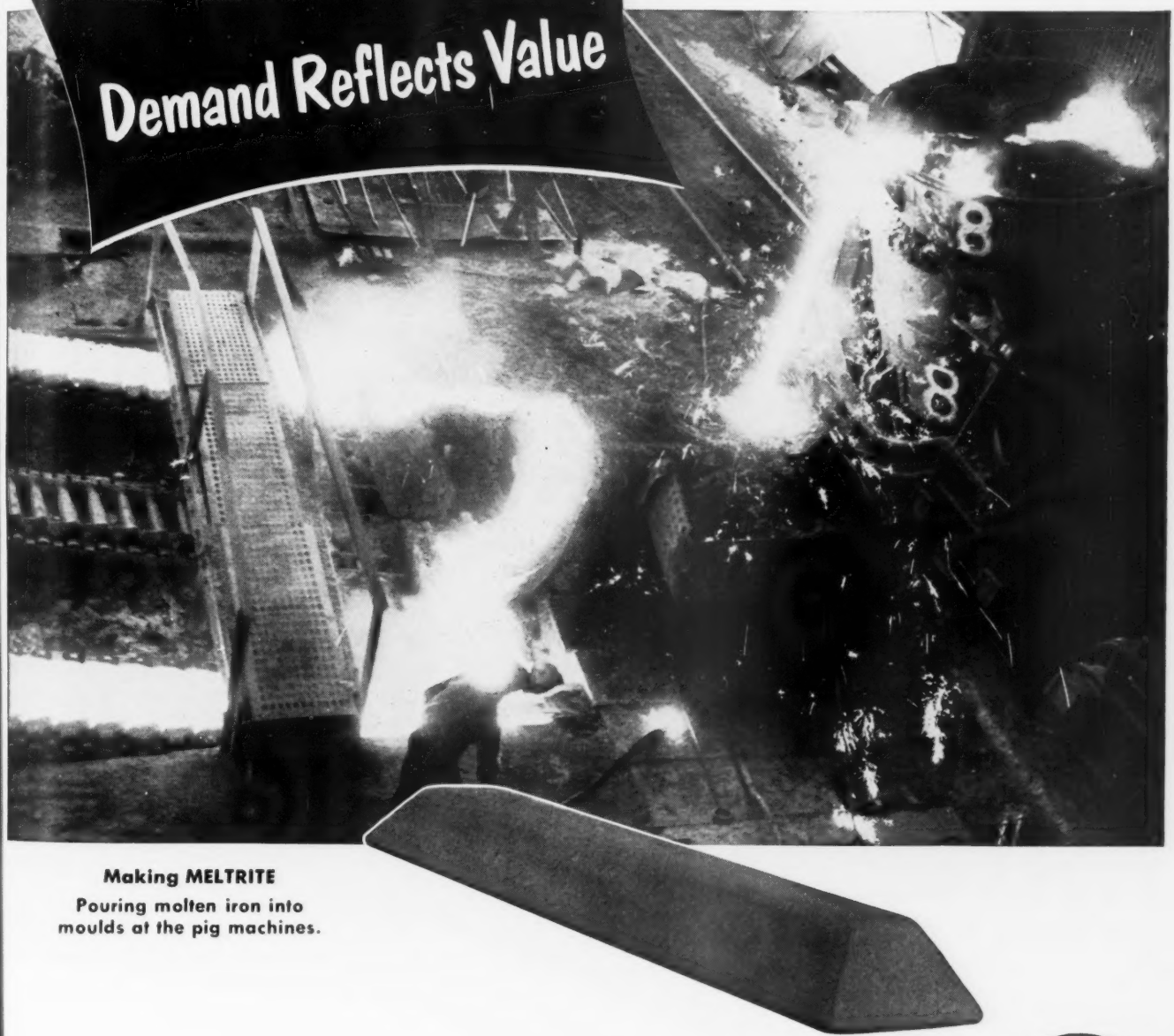

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Adventures of Bill

By PAT DWYER

Illustration by RICHEY

THE other night I emerged from the bathtub 99.99 per cent pure, and donned the clean linen and all that kind of thing which, fortunately, I had discovered before I shed the usual daily garments. Sometimes through absentmindedness I neglect the proper precaution of examining the linen closet and bureau drawers before I disrobe. Later when I creep out of the tub I am greatly embarrassed to find nothing on the shelves or in the drawers excepting a supply of household linen and a number of garments, excellent in themselves, but not available since clearly they never have been designed for my use.

Arrayed in just a sufficient number of garments to get by the censor, and with the virtuous and contented feeling of a man who has performed his duty, his painful duty, well and faithfully, I descended the stairs and parked my pure—I hope the printer won't make that poor—little person in an easy chair. I felt I really had done enough for one night, that I could knock off, call it a day, ring out, and that I rightfully was entitled to a few hours peace with a pipe and a book—any book.

I anticipated no interruption beyond the usual 1001 questions incidental to the preparation of their homework by certain young relatives who have discovered to their astonishment that teachers at their school are slave drivers. Through experience over a period of many years with a former generation, I have come to regard the present ordeal as of really insignificant importance.

Before the usual seance was well under way, Bill came trickling in and, of course, I had to lay the book aside. Noting my scanty raiment, he inquired solicitously if I was coming or going. I told him I was no mind reader. If he kindly would be a little more explicit and not so parsimonious with his words, I gladly would furnish particulars.

"Heaven knows," he said, "this is no time for a healthy man to be getting out of bed. Certainly you have no cause to be weary except the weariness may be induced from toting that shape of yours around all day."

I countered a trifle tartly that he was wrong on both counts. As a guesser he could qualify as a member in perpetual good standing of that august and useless body which counts our election straw votes. I explained I just had a bath and I could see neither the expediency or the necessity of dressing up like a pig at a fair in view of the fact that I fully intended to go to bed in a short time—after he had forced himself to say goodbye.

"Taking a bath, hey?" he commented. "Well, I guess a bath now and again won't do you any harm. And that reminds me. I had an inquiry the other day from a foreign foundryman on the subject of gating bath tubs. Here, I'll read it to you."

We understand that in some places metal for bathtub castings is poured through a number of wedge or finger gates. Experimentally, we have tried this system. In addition we have used coatings, sprays and washes, but invariably the sand has been seriously eroded with resulting scrap castings. Realizing the many advantages of the wedge gate, colder metal, lighter castings, less burning in, reduced cleaning cost, we shall appreciate comment on the subject. In regular production we operate satisfactorily with natural sand available in this country.

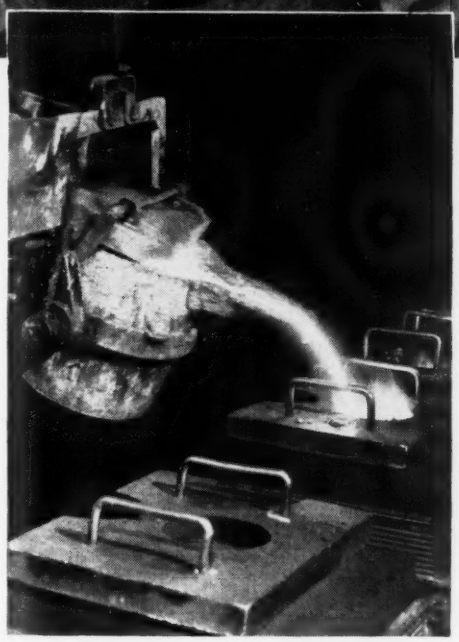
"I trust," I said politely, "you sharpened up the old quill pen and knocked off a page or two of lively comment on one of the perennial subjects of debate between practical foundrymen."

"Well," said Bill, "I'll tell you. Gating of bath tub castings still is in the controversial stage. The great majority of opinion, at least in American foundries, favors the bottom method, an upright sprue at each side, a long runner at the joint line between cope and drag, and a great number of small, shallow gates connecting the runner with the lower rim of the tub. With this method the metal is introduced gently, flows up the sides and over the top and does not scour or wash the face of the mold. Here is a carbon copy of my share of the correspondence:"

Theoretically, the top pouring

(*Concluded on page* 252)

The age-old wail, or the voice of one crying in the wilderness



"Our molders (see top photo) prefer Edco Bottom Boards because they are lighter and easier to handle . . ."

"Our EDCO Dowmetal Bottom Boards Hold Up at High Temperatures . . ."

says ROBERT H. GARRETT, General Foreman
LEBANON STEEL FOUNDRY, LEBANON, PENNSYLVANIA

Lebanon Steel Foundry, a three-year-user of Edco Bottom Boards, is a producer of high quality stainless, special alloy, and carbon steel castings.

"In pouring steel at high temperatures ranging from 2900 to 2980 degrees F., we have found that our Edco Dowmetal Bottom Boards require replacement much less frequently than wood boards" reports General Foreman Garrett.

"Because we use thousands of bottom boards in our operation," he continues, "the fact that we can stack Edco boards in less than half the space required by wood boards is a real advantage. Our molders prefer Edco magnesium Bottom Boards because they are lighter and easier to handle than wood boards."

Lebanon Steel Foundry is typical of scores of foundries, of all types and sizes, that are switching to Edco Dowmetal Bottom Boards because of their performance *and permanence.*

Write today, or phone MAnsfield 6-7330 for price schedule and list of 83 standard sizes available from stock.

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(*Concluded from page 250*)

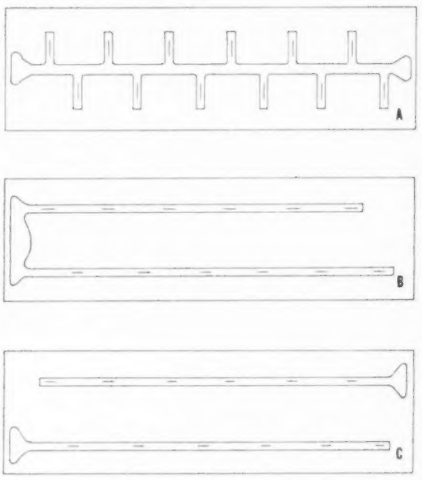
method has many advantages. However, unless the sand has the necessary physical properties to resist erosion from the flowing metal, the top method cannot be used. Many grades of natural sand will serve satisfactorily when the casting is gated in the usual manner along the bottom rim. If the only available sand must be *doctored* to permit top pouring, the extra expense may exceed the advantages.

In a prominent eastern plant described in FOUNDRY several years ago, the molds were rammed with a sandslinger and were gated on top. At that time it was regarded as an experiment. The facing sand on top of the mound forming the inside of the tub was reinforced with a small addition of flour, about 1 part flour to 20 parts sand. In practice described in an article presented in FOUNDRY, November, 1946, the molds are gated along the bottom rim in the old-fashioned manner. Apron type tubs are poured from three ladles, one at each end and one at one side in the center. Under your present conditions a possibility exists that the first course of sand inside the pattern is rammed too hard, or contains too much moisture. Either or both of these conditions will cause any sand to cut or wash.

When and if you try top gating again—and of course you will try again—I suggest you set up at least 12 gates, 3 in. wide and tapering from a thicknes of ½-in. at the top to ⅛-in. at the bottom. These gates are to be served by a long pouring basin on top of the cope. Three alternative types of pouring basins are shown in the accompanying sketch, which is not drawn to scale. Metal is poured into basins *A* and *C* from two ladles, one at each end of the flask. Basin *B* is designed to be filled from one ladle

A possibility exists that in former attempts to pour metal through top gates, you used only three or four and you poured the metal from three or four ladles directly into those gates. Green sand will not stand up under the terrific impact and will cut or wash. To minimize this impact the iron should be poured into a long basin on top of the cope. The basin will feed all gates simultaneously.

One of the primary objects of any gating system is to transfer the metal from the ladle to the mold in the most convenient manner. Naturally the cost-minded foundryman will favor the system which requires the minimum of metal. This factor immediately would rule out the somewhat elaborate gating method referred to in a preceding paragraph and shown in the accompanying illustration. The legitimate objection disappears where the correct amount of metal to fill the mold, minus the pouring basin, is taken in the ladle. By the time the mold is filled the pouring basin will be empty. Several platform and suspended type scales are available for weighing the metal at the beginning of the journey between the furnace and the pouring station. The resulting saving in metal will pay for the scales many times over, and in addition will remove one of the many variables in the constant problem of operating a foundry at a profit.



Alternative types of pouring basins

Stagger the wedge gates along both sides of a center line from one end of the pattern to the other end, so that both sides of the mold will fill up at the same time. With a relatively small amount of metal flowing over the sand under each gate, the sand will resist the scouring action. The total volume will fill the mold as rapidly as an equal volume entering through a small number of small gates. Before drawing the gate patterns out of the sand, a long wood runner block is placed on top and sand is rammed around it to form a pouring basin. With ordinary care this type of basin will be firm and clean and more satisfactory in every way than a basin cut with a tool. The metal may be poured from a crane ladle holding sufficient metal to pour two or more castings. Alternatively the basin may be filled from two smaller ladles, one at each end.

Arthur D. Little Inc., industrial research and engineering firm of Cambridge, Mass., will open a new office in the Board of Trade Building, Room 3832, Chicago 4.

Publishes Booklet on Blast Cleaning

Pangborn Corp., Hagerstown, Md., has published a 32-page, 8½ x 11-in. booklet entitled "Blast Cleaning," which discusses all phases of blast cleaning and its development. Written by Victor F. Stine, company vice president, the booklet supplies nontechnical information to individuals who want to know more about the possibilities of blast cleaning in their fields.

Seven chapters cover the why of blast cleaning, its background and development, the economics of the process, modern blast machines, modern abrasives and blast cleaning applications. The last chapter is a glossary of terms.

Research Is Called Only Answer to Air Pollution

The answer to air pollution is research and development, not legislation, Dr. John T. Rettaliata, president, Illinois Institute of Technology, told a dinner meeting of the Midwest Air Pollution Prevention Association in Gary, Ind., Oct. 15. He declared, "The sooner the research and development programs are stepped up, the sooner we will get rid of objectionable and harmful air pollution." Stopping air pollution without closing down industries is much more difficult than passing legislation to outlaw pollution, he continued.

Dr. Rettaliata stated that the problem of air pollution can be solved only if it is struck at its core. "Science has been responsible in part for the contamination of air," he said, "and science has the greatest potential for seeing that air pollution is made harmless."

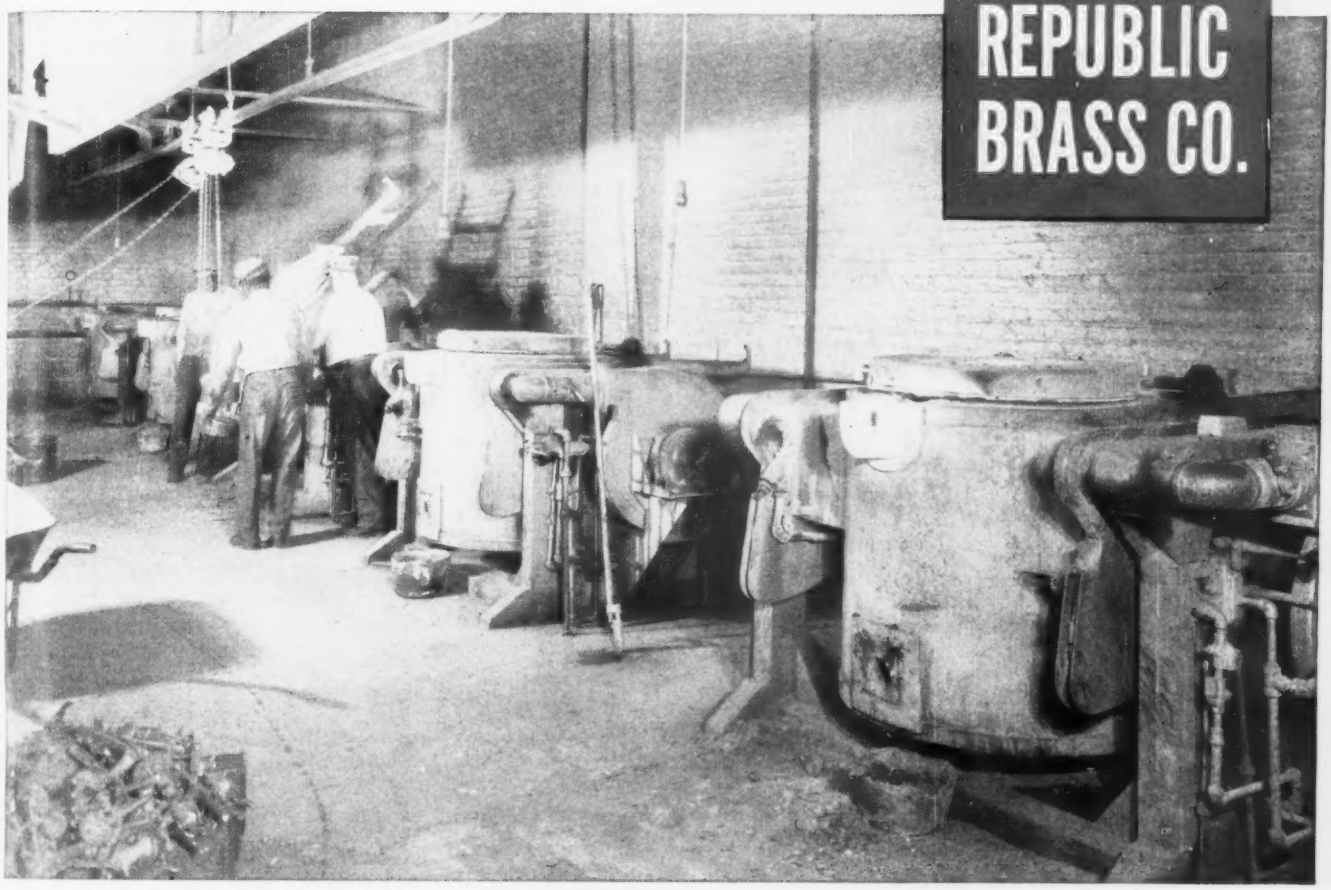
Book Review

The Mainspring of Human Progress, by Henry Grady Weaver, paper, 5 x 7½ in., published by The Foundation for Economic Education Inc., Irvington-on-Hudson, N. Y. Price $1.50 (available in cloth binding for $2.50).

Dedicated to the principle that only free men can make effective use of their imaginations and creative abilities, *The Mainspring of Human Progress* deals with such fundamental and ever-present issues of our time as war, the purpose of government, economics, religion and how to preserve our independence in a society based on interdependence. First published in 1947, it has sold more than 200,000 copies. This edition has been revised and has an index.

6 LINDBERG-Fishers for 6 years

and all's well at REPUBLIC BRASS CO.



LINDBERG-Fisher BRASS MELTING FURNACES STAND THE GAFF

All's well at The Republic Brass Co., (Division of Briggs Mfg. Co.), Cleveland, Ohio—manufacturer of water faucets and related plumbing fixtures. In 1945, as part of a modernization program, Republic installed six Lindberg-Fisher brass melting furnaces. These oil fired, constant arc, nose-pouring furnaces have more than withstood the test of time . . . and maintenance has been almost nil.

Here's what Mr. J. J. Smith, Republic's foundry superintendent thinks of his six Lindberg-Fisher brass melting furnaces:

"We have had six Lindberg-Fisher brass melting, nose-pouring, 1200 pound capacity furnaces for six years, and have had very good results from them . . . they deliver more than 100 heats per crucible . . . one hour twenty minutes per heat . . . 18 months lining life. They have performed very satisfactorily as to upkeep, and we have had excellent operating results."

Check these advantages of Lindberg-Fisher Hydraulic Nose-Pouring Melting Furnaces

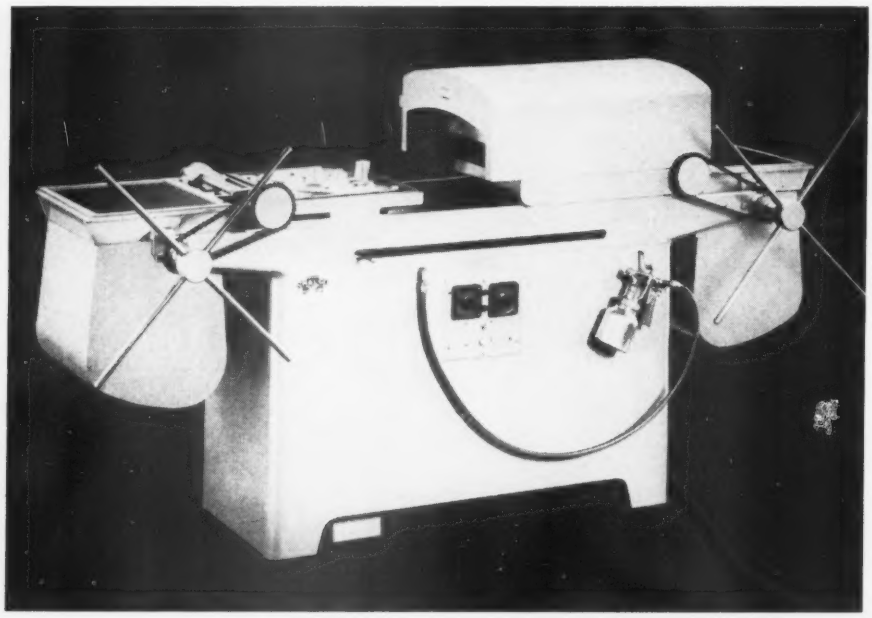
- Constant pouring arc regardless of degree of furnace tilt.
- Rate of pouring always under positive and constant finger-tip control.
- Special trunnion mounting permits lower construction than hand tilting furnace.
- Reduced height facilitates charging cold metal, and observation of metal.
- Metal waste and pouring hazard greatly reduced by closeness of ladle to pouring spout.
- Labor saving . . . simple control enables one man to pour and transfer metal.

Write for Bulletin No. 57-A for more information on MNP-Motorized Tilting and HNP-Hydraulic Tilting Constant Arc Nose-Pouring Furnaces.

LINDBERG-Fisher MELTING FURNACES

Lindberg Engineering Company, 2453 West Hubbard Street, Chicago 12, Illinois

New EQUIPMENT a



Shell Molding Machine: Shalco Engineering Corp., 81 Encina Ave., Palo Alto, Calif., and Shallway Corp., South Fourth St., Connellsville, Pa.—Shell molding machine, incorporating dual dump boxes and choice of gas or electric curing oven, has new features designed to increase output and uniformity of molds. Reported to produce up to two shells per minute, the unit is available with automatic timers for both inversion and curing cycles. Ball-bearing-mounted, hinged pattern is said to insure positive alignment. Standard features include automatic dump box clamps, counterbalanced pattern frame and dump boxes, sealed ball bearings throughout, positive air-actuated shell ejection, thermostatically controlled pattern temperature and heat-resistant, permanently bonded silicone dump box seals. A single capstan swings the pattern to the locked position over the dump box, inverts the assembly and returns the pattern to position. The curing oven rolls over one pattern and mold while the operator strips the mold from the other pattern and handles the inversion cycle at that end of the machine. The curing oven then is moved to that end, and the first cycle is repeated.

For More Details Circle No. 1—Page 257

Mudding and Patching: Delta Oil Products Co., Milwaukee 9 — Plastic type mudding and patching compounds for sealing core joints and repairing core defects are reported to have been improved so that they are smoother and easier to work. They do not expand or contract during drying, are highly refractory and assertedly form a bond which eliminates the possibility of gas leakage at core joints.

For More Details Circle No. 2—Page 257

Hot Materials Mitt: Singer Glove Mfg. Co., 860 West Weed St., Chicago—Mitt for handling hot materials is made of three layers of ma-

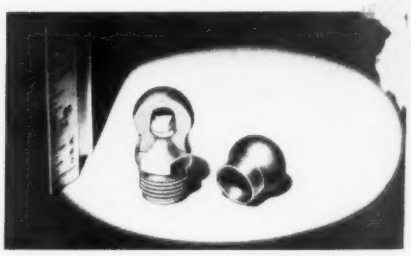
terials. Wool provides insulation; leather gives long life and protection against sharp and abrasive surfaces; and asbestos protects leather from shrinking and resists fire. Mitt is stitched with steel staples, and back is open for ventilation. Although full protection is given to the side and back of the forefinger area, the mitt can be flipped off the hand and held on wrist by a special strap.

For More Details Circle No. 3—Page 257

V-Belt Kit: Brammer Corp., 684 Broadway, New York 12—Emergency V-belt kit assertedly facilitates replacement of broken V-belts without dismantling of machinery. Each kit contains a planned footage of detachable V-link belting, a simplified tool for attaching and a folder of instructions. Kits come in four sizes of belting, with which all FHP and almost all multiple V-belts can be replaced.

For More Details Circle No. 4—Page 257

Grease Fitting Cover: Winner Mfg. Co., Box 945, Fort Wayne 1 Ind.—Neoprene covers for use on all pieces of equipment using either Zerk



or Alemite type grease fittings keep dirt and other abrasives from entering fittings. Easy to snap on or off, they prevent excessive wear caused by dirt particles normally forced into unprotected fittings with each application of new grease and save time usually required to clean fittings before each lubrication.

For More Details Circle No. 5—Page 257

Temperature Indicators: Tempil Corp., 11 West 25th St., New York 10— Sticks and pellets for 525° F have been added to the company's line of temperature indicating materials to meet the demands for a means to indicate that temperature.

For More Details Circle No. 6—Page 257

Metal Identification: Spot-Testers Inc., Metallurgical Testing Division, 110 Polk St., Newark 5, N. J.—Light weight, completely assembled metal testing kit contains all the necessary solutions to identify the following metals and alloys: Aluminum, copper, tin, nickel, manganese, phosphorus, iron, steel, mo-

UPPLIES

For More Details on these Items Use Reply Card—Page 257

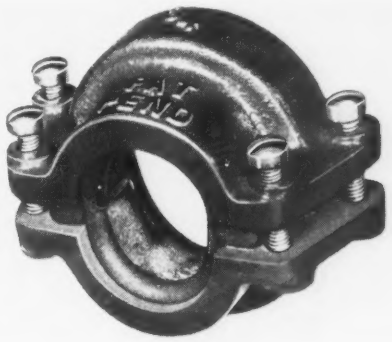
lybdenum, cobalt, lead, antimony, zinc, cadmium, monel, cupro-nickel, nickel-chrome stainless metals and many others. Complete instructions come with the kit, and no knowledge of chemistry is required. A set of metal standards, glass rods, spot plates, a magnet and a file are included. Results assertedly can be obtained in less than two minutes.
For More Details Circle No. 7—Page 257

Arc Welder: Westinghouse Electric Corp., Box 2278, 401 Liberty Ave., Pittsburgh 30—Design modifications and use of aluminum are stated to have resulted in decreased weight, size reduction, simplified construction, improved weather protection and better ventilation of the company's selenium rectifier direct current arc welder. Axial flow ventilation permits incoming air to flow vertically through the welder, following natural convection; overload protection guards the welder from damage when it is overloaded; and an exclusive control feature eliminates short outs during welding applictions requiring short arc. Standard sizes are 200, 300 and 400 amp, but 300/600 and 400/800-amp duplex models also are available. Essentially two smaller units mounted on a common bedplate and enclosed in a single case, the duplex machines can be used as a single unit or as two units, each with half the capacity.
For More Details Circle No. 8—Page 257

Cleaning Gun: C. A. Roesch & Co., 1221 South Hope St., Los Angeles 15— Sand blast, liquid and air cleaning gun operates on air pressures of 75 lb and up. Maximum efficiency is obtained at 100 to 140 psi. Gun has metal body, precision built valve and trigger assembly and hardened steel jet and nozzle. It comes in a kit which also contains three extra nozzles, an extra jet, a glass sand container with cap, machined brass fittings, a 3-ft rubber hose and a wrench for removing and installing the jet.
For More Details Circle No. 9—Page 257

Automatic Lubrication: J. N. Fauver Co., 51 West Hancock, Detroit 1. Automatic oiling system for plain, ball and roller bearings, vees, slides, ways, rollers, cams, chains, gears and transmissions has no moving parts. Operating solely on compressed air, it atomizes oil into microscopic particles carried in the airstream and distributed through tubing. Compressed air enters the unit at 100 psi and passes through a regulator, where pressure is reduced to 10 psi. As air passes through the venturi, it draws oil from the reservoir in adjustable amounts. The mixture of oil and air is thrust against a reclassifier which reduces it to minute drops of oil that lubricate bearings. It can be installed to deliver lubrication at any point in completely atomized, spray or liquid oil forms.
For More Details Circle No. 10—Page 257

Pipe Clamp: Holoal Mfg. Corp., P. O. Box 95, Bellerose 26, Long Island, N. Y.—Cast iron fitting is made

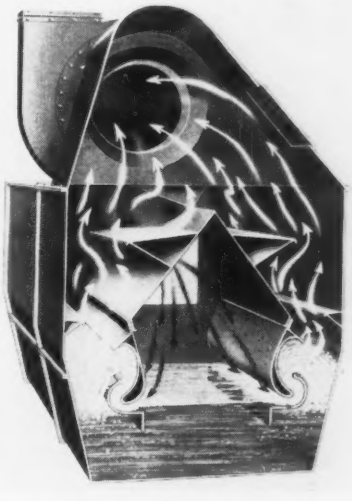


in two parts joined by four screws and is said to seal pipe leaks quickly, safely and without cutting off flow in the system. It is designed to enclose the leak within captive Neoprene gaskets when the screws are tightened around the pipe. The sealing gaskets form a gas-tight chamber which equalizes pressures inside the pipe and out. Because the fitting itself exerts no pressure on the leak or on the weakened area around it, it eliminates the risk of collapse or of enlargement of the defect. The connectors also may be used to assemble temporary and emergency lines of great strength without threading the pipe units. It is reported to be tested safe at pressures up to 150 psi. Both elbow and straight types are available.
For More Details Circle No. 11—Page 257

Lift Truck Drive: Clark Equipment Co., Buchanan, Mich.—Torque converter drive is being manufactured for the company's fork lift trucks in the 6000 to 7000-lb capacity range. The automatic transmission makes it possible to operate a gas-powered fork lift truck with an accelerator, a brake pedal and a forward-reverse selector lever on the steering column. Elimination of gear clashing during gear engagement is said to reduce maintenance cost. Additional advantages include smooth acceleration, more positive driver con-

Dust Collector Uses S-Shaped Water Curtain

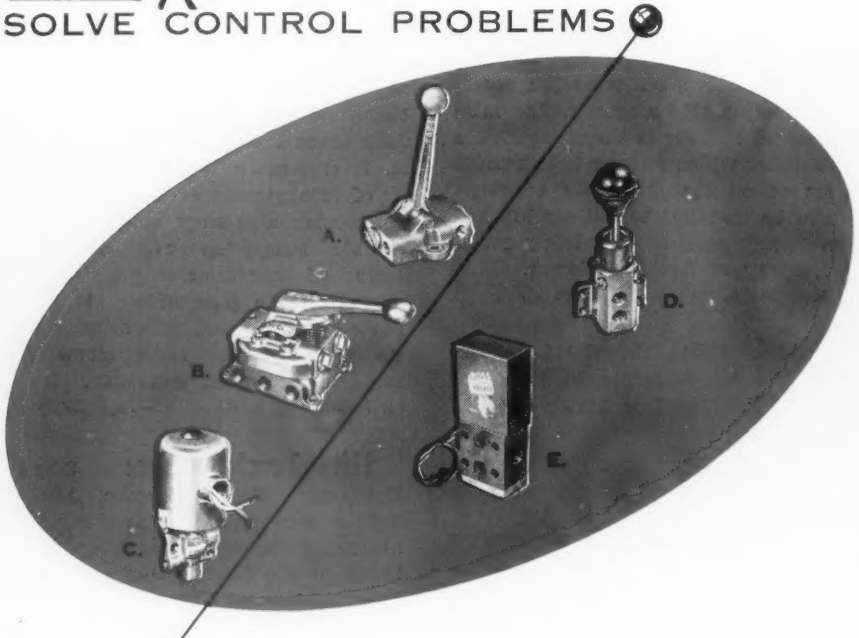
DUST collector is an improved hydrostatic precipitator that separates dust from air by an S-shaped water curtain. It is available in three basic arrangements which differ only in hopper design and means of sludge removal. The three arrangements provide manual cleanout, continuous drain and sludge ejection by flight conveyors. Improved features include nonplugging water entrainment separators; heavier sludge ejector mechanism; wider range of sizes and capacities; and section construction that permits field conversion from one arrangement to another. Machine now is made in sizes for capacities from 1000 to 48,000 cfm. Manufacturer is American Air Filter Co., Louisville 8, Ky.



For More Details Circle No. 12—Page 257

IF IT'S A VALVE FOR FOUNDRY WORK— ROSS HAS IT

SMALL *Ross* VALVES SOLVE CONTROL PROBLEMS



Ross makes hundreds of valves especially designed for small, fast, single or double acting cylinder applications on all types of machine tools, jigs, fixtures, small punch presses and for remote pilot operation of large valves.

A. 600 series—three-way or four-way—hand and foot—¼" pipe—horizontal or vertical handle—single or double treadle.

B. 880 series—three-way or four-way—hand and foot—¼" and ⅜" pipe—horizontal or vertical handle—single or double treadle.

C. Inline direct operated solenoid — straight-way and three-way — normally open and normally closed —⅛" pipe.

D. Straight-way or three-way normally closed — ¼" pipe — various heads.

E. Four-way direct operated solenoid—¼" pipe—can be converted to three-way by plugging cylinder port.

Large or small—Ross has the most complete line of operating valves in the industry. Ask Ross for any air control information.

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trol, quick and effortless change from forward to reverse motion and vice-versa and controlled inching ability. The firm reports that the new drive substantially increases work capacity of gas-powered trucks with standard (conventional) transmissions and at the same time reduces operating and maintenance costs. The unit later will be available for both lighter and heavier truck models. It is not available for field installation.

For More Details Circle No. 13—Page 257

Welding Benches: Industrial Equipment Bench & Mfg. Co., 98 South St., New Britain, Conn.—Constructed to stand by itself, welding

bench has 36½ x 36½-in. top on which fire brick can be installed. Height is standard 33⅝ in. Bench is equipped with 5 x 18 x 22-in. drawer and with a partitioned shelf for welding rods. Legs are electrically welded into formed sections. Drawer reportedly will not bind or cramp, regardless of how nearly full it is, and is available with a choice of lock or padlock attachment.

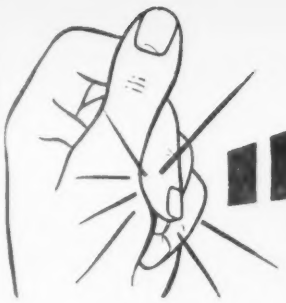
For More Details Circle No. 14—Page 257

Ladder Shoe: Aluminum Ladder Co., Worthington, Pa.—Safety shoe for straight and extension ladders is made of cast aluminum and can be used with either rubber tread or spike on the floor surface. Because it will not throw sparks, it is particularly suitable for use around volatile fluids. Shoe can be attached to almost any metal or wooden ladder.

For More Details Circle No. 15—Page 257

Vapor Degreaser: Baron Industries 241 West Avenue 26, Los Angeles 31—Unitized method of vapor degreasing cleans industrial parts in non-inflammable trichlorethylene vapors. Oily and greasy parts are lowered into the vapor zone of the barrel type degreasing unit and cleaned in less than 1 minute. Continuously pure, uncontaminated vapors penetrate all crevices and leave parts ready for further processing. Unit requires 5 ga

(*Continued on page* 259)



IDEAS FOR FOUNDRYMEN

AVAILABLE FOR THE ASKING—This reader-service is designed to provide foundrymen with "idea" and reference material. Listings are selected from company product literature and reprints of special FOUNDRY editorial articles.

71. Foundry Efficiency

Fischer & Associates—This foundry check list can help you show how efficiently your operation is running from sand handling to finished product handling. Various operations are broken down, and questions are asked about each. Your checkmark in "Yes" or "No" columns sent to this company will get you competent advice on improving your operation.

72. Fans & Blowers

Chicago Blower Corp.—Capsule data on various fans, blowers and exhausters are given on this data sheet, which shows how to get more information on any unit if desired. Eight units with various capacities, ranges and purposes are described.

73. Industrial Ovens

Burdett Mfg. Co.—Conveyorized and batch-type ovens are illustrated and described in 4-page folder. One unit shown dries green sand molds for automotive transmission housings to depth of ½ in. in 15 minutes. Special gas burners are featured, designed for easy combination and flexibility.

74. Sand Conditioner

The Moulders' Friend—The reversible Moulders' Friend is described in 4-page bulletin. This machine is self-propelled, and has two travel and conditioning speeds in either forward or reverse directions. It will recondition sand, and combines screening, moistening, bonding and fluffing actions. Capacity is up to 1 ton of sand a minute.

75. Ball Bearing Units

Stephens-Adamson Mfg. Co.—Zone Hardening is a heat treating process by which the inner race ring of Sealmaster ball bearing units is hardened through the ball path section only. This feature and others are described in catalog 845 which also describes units available in many special housings, plus a complete standard line.

76. Sea Coal Replacement

Delta Oil Products Co.—Permi-Bond, described in illustrated bulletin of 4 pages, is a pure hydrocarbon which is completely volatile at elevated temperatures and which is intended for green sand facing. Total ash is 0.2-per cent maximum. Method for determining percentage of Permi-Bond in molding sand is explained.

77. Multi-Purpose Welder

Harnischfeger Corp. — "Practical Ways to Use the New P&H Dialectric Welder" is title of 24-page booklet R-21. Sections cover preparing for the welding operation, pointers for specific welds, tips about weldability of metals, useful projects and repairs that can be done, and the special electrodes designed to handle various jobs.

78. Box Car Unloader

Butler Bin Co., Carscoop Div.—The model 203 Carscoop is a highly maneuverable rear-steering unit with a 12-cu ft bucket that is hydraulically controlled. It piles high, is offered with three types of drive tires and handles easily in close quarters. Send for 4-page illustrated bulletin 250C.

79. Continuous Power Convevor

Richards-Wilcox Mfg. Co.—"Zig-Zag, the Rail-Way of Economy" is title of 4-page bulletin F-160 which describes the No. 2035 Zig-Zag continuous power conveyor. It meets requirements for light handling at slow speeds and negotiates short radius horizontal and vertical curves proportioned to the product to be handled. Components are described and curve data are given.

Additional Information?

For additional information on any of the items described under "New Equipment and Supplies," "Trade Publications" or "Helpful Literature" in this issue—simply circle corresponding item numbers on one of these cards

FOUNDRY 11-53

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80. Vertical Core Ovens

Detroit Sheet Metal Works—Gas, oil and electrically heated vertical core ovens are the subject of illustrated bulletin No. 52-5. Units are for both batch and continuous work, and utilize cross-flow circulation and recirculation for close process control. Various set-ups are illustrated, showing convenient adaptation to conveyorized and battery work.

81. Tractor Bucket Loader

Tractomotive Corp.—6-page illustrated form 938 describes and illustrates the TL-10 Tracto-Loader, a bucket-equipped unit with hydraulic torque converter drive and clutch type transmission. Capacity is ¾-cu yd. It has four speeds forward and same number in reverse. Specifications and pictures of other attachments are included.

82. Core Blowing Method

Federal Foundry Supply Co.—Three Pulsator San-Blo core blowers are described with specifications in 4-page folder. Blowers feature "LPP" or low pressure pre-fill by which low air pressure is used to fill core boxes and full line pressure used to pack the sand. This minimizes core box wear and permits blowing wooden core boxes never blown before.

83. Aluminum Alloys

Apex Smelting Co.—Physical characteristics of Ternalloy aluminum alloys are given in 4-page technical data folder. Also included are mechanical properties and compositions for Ternalloy. Principal alloying constituent is ternary compound $Al_2Mg_3Zn_3$.

84. Hoppers

Roura Iron Works, Inc.—Self-dumping hoppers available in ½, ¾, 1, 1½, and 2 cu yd sizes are described in illustrated form PM100. Platform or fork lift trucks can be used with these hoppers. Listed are such accessories as casters, stacking stands, etc.

85. Diamond Polishing

Buehler Ltd.—Diamet Hyprez diamond polishing compound for use in metallurgical specimen preparation is described in 4-page illustrated bulletin. Available packagings and quantities are shown. Bulletin also illustrates and describes a research polishing desk.

86. Shell Molding

Sutter Products Co. — Automatic shell molding machines are described and illustrated in bulletin No. S. Three models are available in various sizes. Bulletin gives operating and construction features, also mounting dimensions.

87. Welding Electrodes

A. O. Smith Corp., Welding Products Div.—Mild, low alloy and stainless steel electrodes are compared and classified in this data folder. American Welding Society classifications for all types shown are given. Many companies are represented.

88. Silicone Greases

Dow Corning Corp. — Laboratory lubricants for glass and ceramic stopcocks, silicone greases for electric motor bearings and valve sealing compounds are among silicone preparations described in collection of technical data sheets and booklets. Physical characteristics are analyzed.

89. Bulk Materials Conveyor

Brady Conveyors Corp.—For transporting granulated, lumpy and all bulk dry materials to remote delivery points, Flo-Veyor system is shown in 4-page illustrated bulletin. Materials are conveyed by means of air pressure in a piping system. Basic design and operating advantages are discussed.

90. Sand Control System

Harry W. Dietert Co.—Consisting of mated foundry units that are located at the sand mixers, Dietert-Detroit automatic molding sand control system insures accurately controlled sand. System is subject of descriptive 4-page folder.

91. Packaging Tape

Mystik Adhesive Products—Pictured applications of Flexstron high tensile, filament reinforced tape for strapping, bundling, binding, reinforcing, palletizing, packing and packaging are presented in 4-page bulletin 2337 and in pocket-size 6-page form 2349.

92. Air Pollution Control

Grindle Corp. — 20-page booklet "The Cupola Emission Problem and Its Solution" is now available. Data in this work were presented at a recent meeting of the Air Pollution Control Association by A. J. Grindle. Feature is comparison of approximate efficiencies of various types of dust suppression equipment for various particle sizes and average specific gravity.

93. Core Making Compounds

Pelron Corp.—Brief description of Pelron custom engineered core oils and standard core making compounds is given in 4-page illustrated folder. Binders, core washes and core pastes are mentioned as well.

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(*Continued from page* 256)

of cleaning solvent for effective operation. Dirty solvent is reclaimed for reuse by an air-cooled condenser which also controls vapor height. Clean, pure vapors are generated by electric elements mounted in the base of the assembly, and a thermostatic control provides operational safety and economy. The 50-gal unit has a working area 23 in. in diam and a vapor depth of 18 in.

For More Details Circle No. 16—Page 257

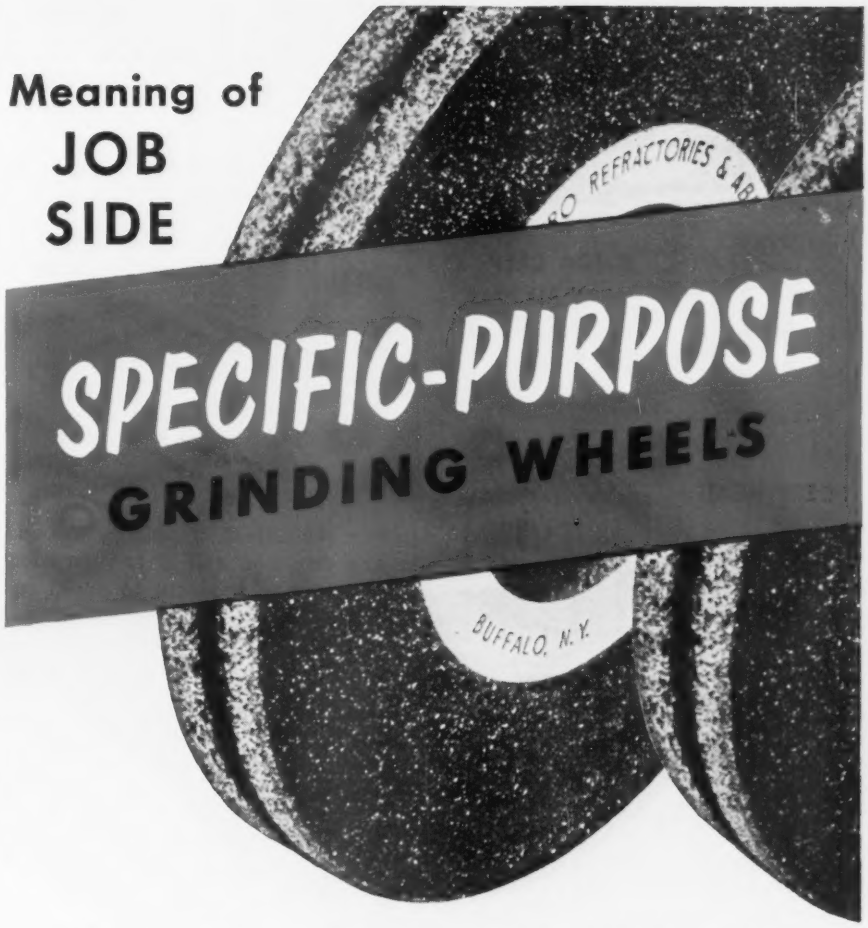
Truck Magnet: Yale & Towne Mfg. Co., Yale Materials Handling Division, Philadelphia — Gas truck

equipped with a lifting magnet supported on a gooseneck boom is said to be especially adapted for handling castings, cast iron or steel borings and steel turnings. Truck capacity is 6000 lb. Truck mounts a 36-v power unit which supplies the current to energize the magnet. Fingertip controls for raising the load and energizing the magnet are within easy reach of the operator. The lifting magnet can be hung at any one of four different positions on the boom. Hook capacity varies from 4700 lb at 36-in. outreach to 3000 lb at 72-in. outreach.

For More Details Circle No. 17—Page 257

Welding Goggles: Linde Air Products Co., Division of Union Carbide & Carbon Corp., 30 East 42nd St.,

New York 17—Welding goggles are said not to fog up even in hot, damp weather. Sixteen vents located behind the lens retaining rings permit continuous circulation of fresh air across the inside surface of the lenses. Designed to fit comfortably over spectacle frames of workers who must wear corrective eyeglasses, they are adjustable for broad or narrow features. Frames are made of flame resistant, high impact nylon, and a metal bar across the top of the eye



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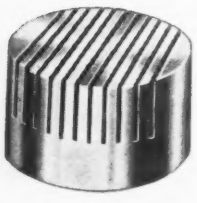

X-TRA DEEP HEAD
.156
Wide Slots
.014

DEEP HEAD
.093
Wide or Narrow Slots
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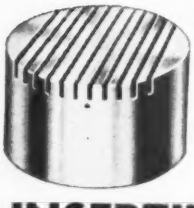
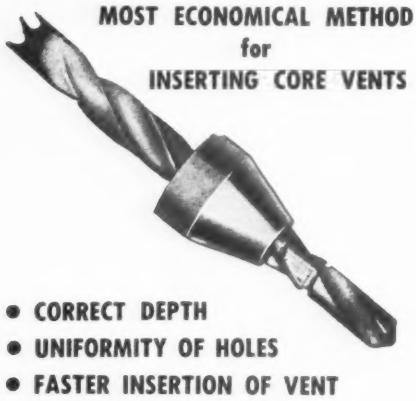


SHALLOW HEAD
.031
Wide or Narrow Slots
.014 .010

INSERTING DRILL

MOST ECONOMICAL METHOD for INSERTING CORE VENTS



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- UNIFORMITY OF HOLES
- FASTER INSERTION OF VENT

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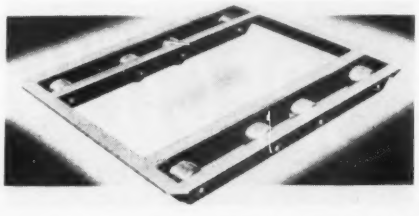
cups holds them rigid, so that goggles can be raised or lowered conveniently with one hand. They are green and come equipped with standard "AA" type lenses.

For More Details Circle No. 18—Page 257

Pallet Roller: Frank L. Robinson Co., Latham Square Bldg., Oakland 12, Calif.—Pallet rollers with 360 degrees directional movement



permit movement of palletized loads in any direction and to any location needed. They are said to speed up material flow and product movement and to remove congestions when fork trucks are not available. Rolls are 3½ in. in diam and are crowned to afford free rolling and floor protection. Units feature heavy-duty, fully lubricated bearings; welded steel construction; design to retain parallelism and alignment of frame; dead, large hexagon axles cotter-keyed to frame; and large bearing area.

For More Details Circle No. 19—Page 257

Self-Dumping Hoppers: Roura Iron Works, 1401 Woodland Ave., Detroit 11—Firm's self-dumping hoppers of from ½ to 2-yd capacity now

are available with a base that permits moving them with a jack-tongue as well as with a fork lift truck. Worker can move the hopper as he needs it, without waiting until a fork truck is free. He can insert the jack-tongue in the socket on the base, wheel the container to where he wants it and replace it with an empty one. To accomplish this mobility, wheels have been added to the base of the hopper.

For More Details Circle No. 20—Page 257

Potentiometers: Bristol Co., Waterbury 20, Conn.—Electronic recording potentiometers are available in the form of time-temperature pro-

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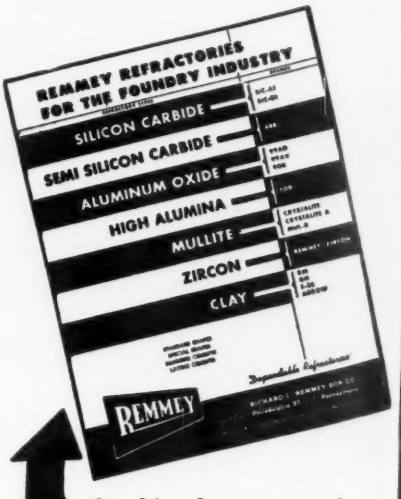

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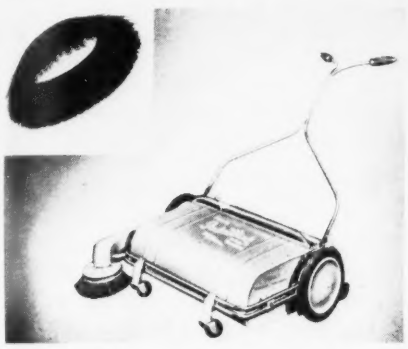
gram controllers. Devices regulate temperature according to a predetermined schedule of changing values so that any desired program, such as a heating, soaking and cooling cycle, can be maintained accurately. Desired schedule of temperatures is prescribed by the contour of a transparent plastic cam, and the same controller can be used to maintain any number of different programs since cams of different contours easily are cut and interchanged. The instruments employ an electronic control system with proportional input action optionally available.

For More Details Circle No. 21—Page 257

Sweeper Brushes: Parker Sweeper Co., 51 Bechtle St., Springfield 99, O.—Black all-nylon brushes, shown in the inset, are available as refills for side-sweeping wall brush attach-



ments and as the basic brush in all models of the firm's industrial floor sweepers. The nylon bristles are reported to wear and to sweep unusually well. The company will continue to offer side sweeping attachment refills of steel-backed Tampico brushes and three types of fiber basic brushes for replacement on 20 and 28-in. floor sweepers.

For More Details Circle No. 22—Page 257

Electric Drill: United States Electrical Tool Division, Emerson Electric Mfg. Co., St. Louis 21—Built for continuous duty, ¼-in. full ball bearing drill features 100 per cent ball bearing construction, strong aluminum alloy frame, heat treated alloy steel gear, 3-jaw geared chuck and universal motor. No-load speed is 2500 rpm.

For More Details Circle No. 23—Page 257

Chain Drive Overload: Lamson Corp., Dept. D23, Syracuse 1, N. Y.—Device to protect chain drives of all types from overloads trips a limit switch in the event of excessive tension on the drive leg. It consists of an eccentrically located idler sprocket counterbalanced by a weight-loaded arm. Counterbalance is adjustable so that the device operates at any chain tension up to 1000 lb. A lock-

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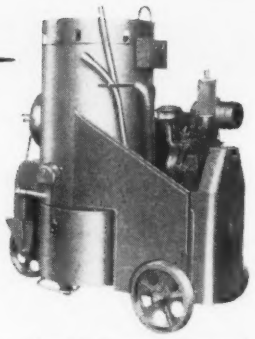

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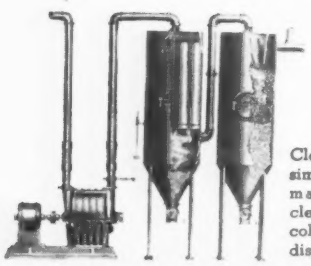

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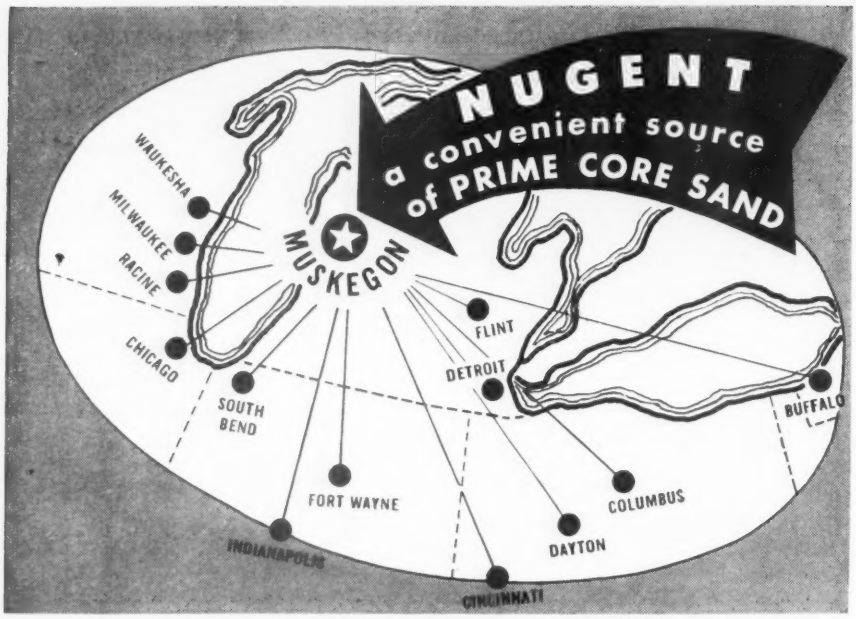

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GREAT LAKES FOUNDRY SAND CO.
Detroit 26, Michigan

1912 **CANNON** core sand 1953

THE NUGENT SAND COMPANY, INC. MUSKEGON, MICHIGAN

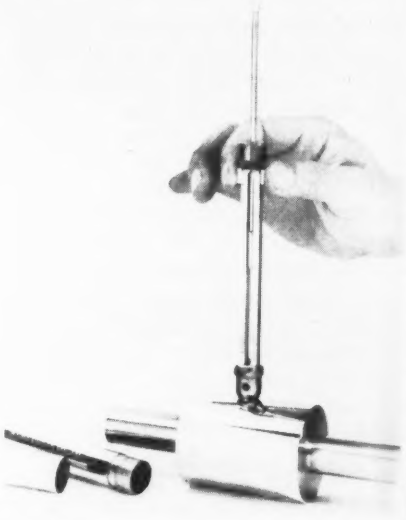
ing lever is arranged so that manual resetting is required to energize the drive once an overload has caused it to act. With an eccentric sprocket shaft 0.875 in. in diam, the unit can be adapted to chain sizes from ½ to 1¼ in. Electrical capacity of the limit switch is 10 amp at 115 v, ac, and can be increased to any specification desired by the use of relays.

For More Details Circle No. 24—Page 257

Mastic Flooring: Flash - Stone Co., 3723 Pulaski Ave., Philadelphia 40—Mastic flooring incorporates a binder which is said to increase stability without loss of tensile strength. Floor is said to be highly resistant to all traffic loads and to do away with drag on vehicular loads. Substance feathers well, reduces vibration and is resistant to attack by grease and oil, although it will deteriorate under long exposure to large quantities of petroleum products. It requires a 24-hr waiting period after installation before it is ready for use.

For More Details Circle No. 25—Page 257

Hardness Tester: Kurt Orban Co., 205 East 42nd St., New York 17—Pocket-sized hardness tester is designed for on-the-spot testing. It is placed in a vertical position on top of the article to be tested, and the rebounding bar, which carries a hardened steel ball point, is raised until held in place by the locking device. When the locking device is released by pressing a catch, the



bar falls and rebounds to a point corresponding to the hardness of the object, where it is retained. Hardness then can be read within an accuracy of 1 point Rockwell C from the position of the indicator ring on the hardness bar against the graduated scale. Conversion tables supplied with the unit permit quick conversion of the scale reading to Shore,

in nonferrous foundries SURFACE INDICATIONS CAN BE MISLEADING

To accurately measure temperature of molten, nonferrous metals, readings should be made *below* the surface.

Portable, handy to use, the Alnor Pyro Lance has a protected thermocouple mounted in the lance tip—it takes temperatures below the surface, where accuracy is unaffected by dross and other surface conditions. Enclosed couple is protected against flame, fumes, and corrosion, assuring long, accurate service under severe conditions.

Pyro Lance models are available for a wide variety of metals and foundry operations. Write today for Bulletin 1724-D and see how you can have low-cost quality control in your foundry. Illinois Testing Laboratories, Inc., Room 511, 420 North LaSalle St., Chicago 10, Illinois.

Alnor

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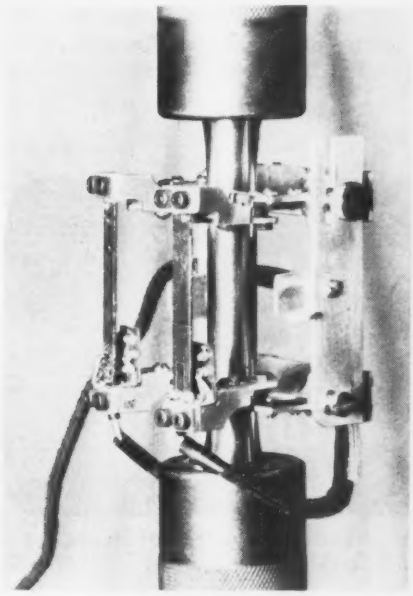
Rockwell or brinell hardness. Two models are available, one of which leaves no indentation on the material tested.

For More Details Circle No. 26—Page 257

Extensometer: Baldwin-Lima-Hamilton Corp., Philadelphia 42—Although still experimental in user applications, extensometers and deflectometers incorporating SR-4 strain



gages as sensing elements are available for various requirements. The extensometer is for use in tensile strength tests of standard 0.505-in. diam test specimens with 2-in. gage length. One illustrated has a measuring range of 0.2 in. when used with a newly developed SR-4 recorder for producing stress-strain curves in rectangular co-ordinates. Other measuring ranges are available. Strain magnification ratios of 50, 100, 250 and 500:1 are obtainable with this instrument. Stress ranges depend upon testing machine indicator ranges. Both tension and compression strains can be recorded with the unit shown. Instrument need not be removed from the specimen before the failure point is reached. Stress-strain recorder records load by movement of the stylus parallel to the axis of the recorder drum. Recorder equipment is operated on 50-60 cycle, 110-v power. Accuracy of strain measurements is 0.2 per cent of the recorder range or 0.5 per cent of reading.

For More Details Circle No. 27—Page 257

Welding Rod: Eutectic Welding Alloys Corp., 40-40 172nd St., Flushing, New York—Oxy-acetylene welding rod for application to cast iron without fusion of the base iron is said to combine dense welds and high tensile strength with good appearance. Available either flux coated or bare, the rod contains special alloy-

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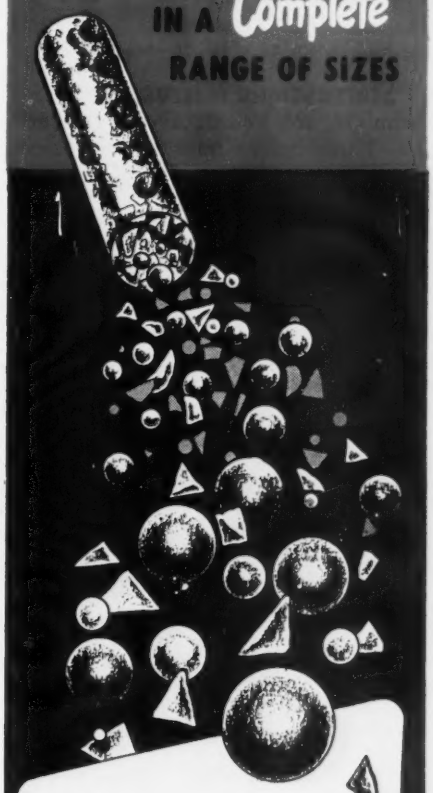

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ing elements for strength and denseness of weld and a coating which results in smooth, clean welds. It will flow out at a base metal heat of approximately 1450-1650°F and does not require fusion temperature in the cast iron base metal to effect the bond. The rod is manufactured in square shape in 1/8, 3/16, 1/4 and 3/8-in. sizes.

For More Details Circle No. 28—Page 257

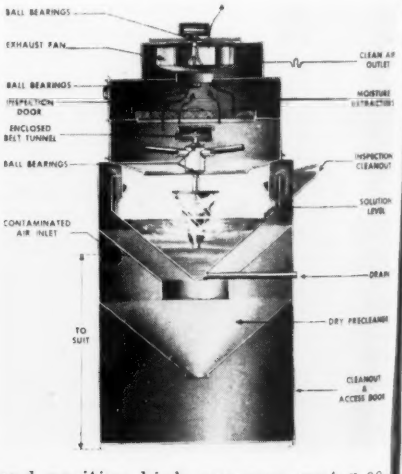
Stereoscopic Microscope: Oppelm Co., 352 Fourth Ave., New York 10—Three design improvements have been made in the firm's model DPG stereoscopic microscope. They include a 180 degree rotating binocular head, a three-way stand and a quick change nosepiece. The rotating binocular head is inclined at a 30 degree angle and turns on a vertical axis to permit either normal or inverted observation. The stand has been planned to allow greater versatility. The column retracts into the base and can be raised or lowered. In addition, the base support can be removed so that the unit can be placed directly on the object to be examined. The new type of nosepiece allows for almost automatic quick change of observation with the three matched pairs of parfocal objectives supplied. Pressure on the nosepiece permits switching from one objective to another.

For More Details Circle No. 29—Page 257

Pocket Pyrometer: Cybertronic Corp. of America, 136 Eighth St., Dept. B-35, Upland, Chester, Pa.—Pocket pyrometer measures 1¾ x 3½ x 3⅞ in. and has a 2.4-in. direct reading indicator dial. Interchangeable thermocouples are said to permit quick and accurate measurement of either surface or subsurface temperatures from 0 to 2500° F. A shock absorbing rubber case protects the instrument against normal shock. Five standard ranges are available: 0 to 600° F; 0 to 1000° F; 0 to 1500° F; 0 to 2000° F; and 0 to 2500° F. Accuracy is plus or minus 2 per cent of full scale deflection. Instrument incorporates a cold-end compensating thermometer and an external adjusting screw on the face that compensates for room or ambient temperature.

For More Details Circle No. 30—Page 257

Dust Eliminators: Schmeig Industries Inc., P. O. Box 4701, Detroit 34—Vertical rotor, wet type dust and fume eliminators for industrial applications are being offered in two types. One unit is used for wet collection and elimination only; the other is a combination primary dry and secondary wet collection unit. Both units combine the cyclonic principle of dust separation



and positive high pressure water action to remove impurities from the air in a rotating torrent of water. For certain applications, other liquids than water may be used. Capacities range from 500 to 50,000 cfm. These units feature low ratio of power to rated capacity; high ratio of water circulated to air volume handled; independent driver rotor and fan to permit adjustment

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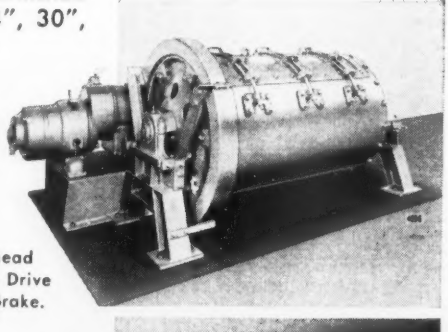
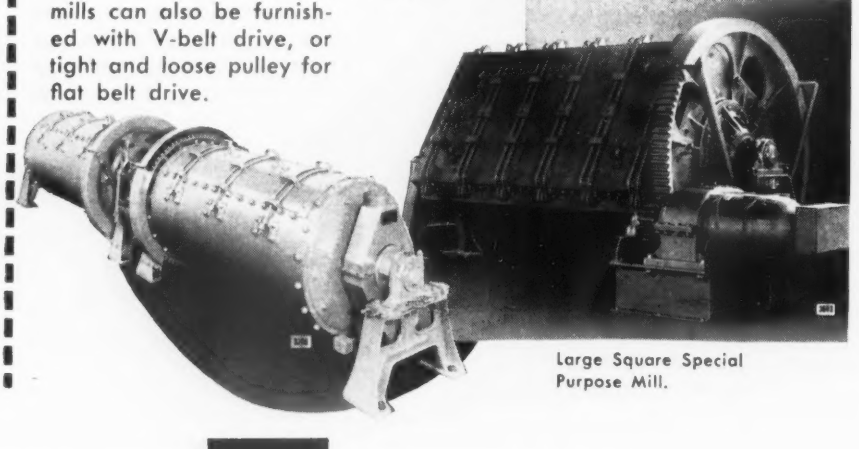


Gearhead Motor Drive with Brake.



Large Square Special Purpose Mill.

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to meet load and operating conditions; automatic liquid level control; self-acting skimoff of floating particles collected in the tank; collection and elimination functions independent of water failure, and other advantages.

For More Details Circle No. 31—Page 257

Flexible Shaft Grinder: Franklin Balmar Corp., N. A. Strand Division, Woodberry, Baltimore 11—Gasoline engine-powered flexible shaft

grinder permits grinding, rotary filing and other cutting and finishing operations without air compressors or electric power. Unit consists of a 5-hp gasoline engine mounted on a wheelbarrow type truck. A 7-in. flexible shaft is attached directly to the shaft of the motor; ¾-in. capacity arbor style hand spindle at the end of the shaft takes any conventional flexible shaft tool and grinding wheels up to 1½ x 10 in. Right angle handpieces also are available. Engine itself is mounted on platform by a swiveled base which moves a full 180 degrees. Swivel plate locks in five different operating positions. Unit also can be used as a fixed bench tool.

For More Details Circle No. 32—Page 257

Spur Gear Hoists: Coffing Hoist Co., Danville, Ill.—A total of 55 different models and sizes of spur gear hoists have been added to the company's line, including 15 sizes of single and multiple chain units with capacities from ¼ to 25 tons. For specialized applications there are plain and geared Army type hoists, ¼ to 10 tons; low headroom hoists, 1½ to 24 tons; clevis-connected hoists, ¼ to 10 tons; and extended handwheel hoists from ¼ to 3 tons. Army and low headroom hoists are integral parts of trolleys, either plain or geared, permitting hoists to work where lack of headroom prohibits use of standard units. Clevis-connected hoists are used where headroom prevents use of standard hoist and trolley lookup: top hook is removed and hoist suspended from special trolley clevis, saving from 3 to 16 in. of headroom, depending on size of hoist. Extended handwheel hoists, for handling hot materials and large or bulky loads, feature handwheels extended to a maximum of 10 ft so that operator can stand at a distance from the load.

For More Details Circle No. 33—Page 257

Motive Crane: Hughes-Keenan Corp., Delaware, O.—Gas-powered motive cranes with 6000, 10,000 and 20,000-lb capacities are designed to

hoist, carry and place loads quickly and efficiently. Rotating boom avoids need in most cases to maneuver the machine in order to place load. Boom

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can be raised from horizontal to vertical position with a full load on the hook. Single operator has perfect vision at all times. Top speeds with capacity loads range from over 15 mph for the 6000-lb model to over 11 mph for the 20,000-lb model. Said to be no more difficult to operate than a heavy motor truck, they feature high maneuverability in extremely close quarters. Initial mechanism which drives the winches and slewing mechanism is constantly in motion. Connection and disconnection are entirely by friction clutches which can be engaged at any time in any way without damage to the machine. Units are available with magnet for lifting scrap and with diesel power.

For More Details Circle No. 34—Page 257

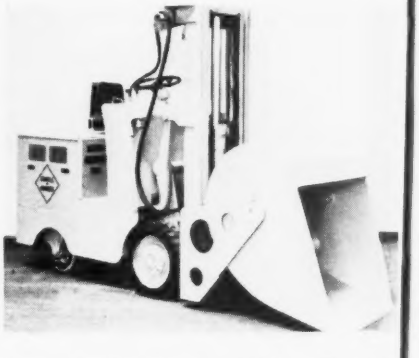
Filament Tape: Mystik Adhesive Products, 2635 North Kildare Ave., Chicago 39—Extra-strong, pressure-sensitive tape is filament reinforced and designed for heavy duty packing, palletizing and shipping operations in industry. Tensile strength is 250 lb per inch of width. Tape is marked at 6-in. intervals, so that the length required for a specific operation can be predetermined and used. It is applied from a hand dispenser and conforms smoothly and tightly to any shape that is desired.

For More Details Circle No. 35—Page 257

Sprocket Chains: Chain Belt Co., Dept. P. R., Milwaukee 1—Improved line of drive and conveyor sprocket chains replaces and supplements a group of standard sizes of the company's steel chains. Area of improvement includes controlled material selection and heat treatment; closer planned tolerances of press fits; better finishes and easier assembly and disassembly. The new series of chains will operate on standard sprockets.

For More Details Circle No. 36—Page 257

Fork Truck Scoop: Elwell-Parker Electric Co., 4205 St. Clair Ave., Cleveland 3—Scoop attachment for use on the firm's hydraulic-powered fork trucks is designed for handling bulk materials without large lumps. It receives its hydraulic power from the same system which operates the

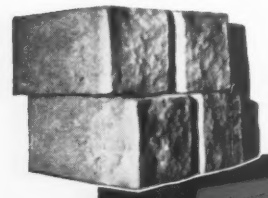


lift and tilt of the vehicle. Scoop is 37⅜ in. wide, has a capacity of 2 cu ft or 3200 lb. Antifriction bearings support the trunnions of the scoop, a double acting hydraulic cylinder moves the unit from loading to carrying position, and the scoop lip features a replaceable wear strip.

For More Details Circle No. 37—Page 257

Goggles: United States Safety Service Co., 1215 McGee, Kansas City 6, Mo.—Line of cup type goggles includes a chippers' goggle and two types of welders' goggles. According to the manufacturer, they provide good ventilation, light weight and comfort without sacrificing strength or durability. Chippers' goggle comes equipped with new plastic lenses which are said to weigh only half as much as safety glass, but to have superior scratch resistance and strength. Two other lens materials also are available. Eye cups for all three goggles are designed for comfortable fit and maximum angle vision.

For More Details Circle No. 38—Page 257



Sawed Two Sides Machine-Cut Cupola Blocks 12" x 6" x 6"

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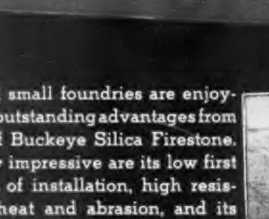
Standard machine-cut, sawed two sides cupola blocks of Buckeye Silica Firestone can be supplied in any required thickness.

Whatever your cupola problem, there is a Buckeye Silica Firestone solution for it . . . our service organization will gladly consult with you at no obligation.



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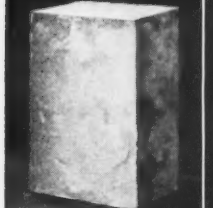

Rectangular Sawed Two Sides. Machine-Cut Liners

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International Congress

(*Continued from page* 109)

ministry of National Education. Papers included: General aspect of education and training in the foundry industry, by D. Waeles, past president of the Association Technique and president of the national council of industrial education; the aims and function of the Ecole Superieure de Fonderie, by J. Laine, director of the school; technical training in the foundry, by M. Coste; training in industrial drawing by M. Prevost.

A. Debar, general secretary of the Association Technique, showed a film illustrating various aspects of technical training. This was followed by three lectures dealing with the subject of contraction cavities—one by M. Neyret, from the point of view of the trained operative; the second by M. Falaise from the point of view of the foundry foreman; and the third by Prof. Albert Portevin and Prof. Paul Bastien, from the angle of the qualified engineer, as treated at the Ecole Superieure de Fonderie.

This part of the program was illustrative of the attention given to technical education and training in the foundry industry in France.

International Committee Meeting—Annual meeting of the International Committee of Foundry Technical Associations was held on Thursday, with its president, Lester N. Shannon, in the chair. The associations of 13 countries were represented: Belgium, Denmark, France, Western Germany, Great Britain, India, Italy, the Netherlands, Norway, Spain, Sweden, Switzerland, and the United States. Official delegates of the American Foundrymen's Society were: Collins L. Carter, president, and I. R. Wagner, immediate past president. They were supported by W. L. Seelbach, past president, William W. Maloney, secretary-treasurer, and Vincent Delport, European representative of the AFS and European manager of FOUNDRY.

By unanimous vote it was decided that the Award of Honor of the International Committee for 1953 would be given to Prof. Albert Portevin, and the Italian association was invited to nominate the recipient for 1954.

The progress reports of the international committee on Testing Cast Iron, on Foundry Defects, and on the International Dictionary, were presented and adopted. A plan to facilitate the exchange of trainees between the member countries was also adopted.

Sites for the international congresses for 1954 and 1955 were confirmed. The Italian delegation, headed by Prof. Dr. Ing. Raoul Duquis, formally

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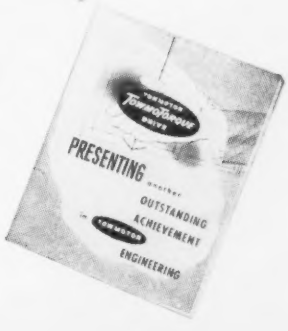

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issued an invitation to hold the 1954 congress in Italy, Florence being the main center. For 1955 it was confirmed that the congress would be held in Great Britain.

The meeting then proceeded to the election of officers for 1954. Achille Brizon, past president of the Association Technique de Fonderie and vice president of the International Committee, was unanimously elected president, the proposal having been formally moved by President Shannon. The Swedish association was invited to nominate the vice president. Tom Makemson, secretary of the Institute of British Foundrymen, was re-elected by acclamation for the post of honorary secretary and treasurer.

The closing session of the Congress was held, with due ceremony, at La Sorbonne. M. Belier, general director of mechanical and electrical industries at the Ministry of Commerce and Industry, was in the chair, representing the president of the French Republic. In opening this session, President Paul Muguet mentioned that 1130 people had attended the congress, a record for Europe. He expressed his thanks to his colleagues, the authors of papers, and to President L. N. Shannon, the presidents of the technical subcommittees and to the official delegates on the International Committee. He then reviewed the work done and the results achieved by the Congress. He concluded by reading a telegram of greetings from President Vincent Auriol of the French Republic

Medal Awards—In the distribution of medals of the Association Technique, two bronze medals were awarded, one to Gabriel Joly and one to Louis Grand, of the Centre Technique. Three silver medals were awarded, one each to Fr. Boussard (Belgium), Pierre Rigaut and Pierre Nicolas. One gold medal was awarded to Georges Delbart, director of the research institute of the French Iron and Steel industry. A second gold medal was awarded to Dr. A. B. Everest, a prominent member of the Institute of British Foundrymen, for his considerable contributions to the knowledge of alloy cast irons.

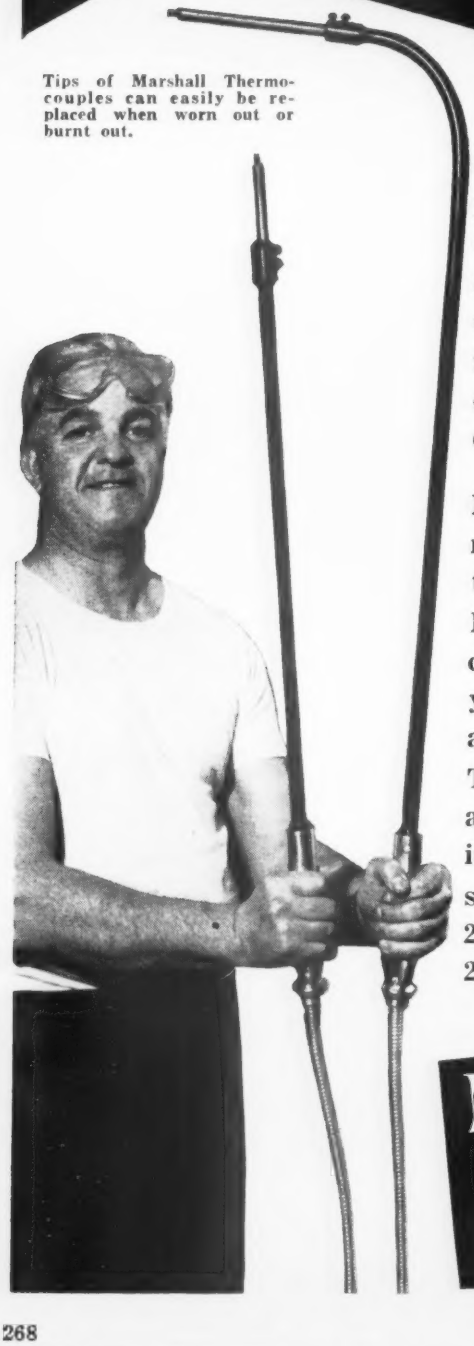
A gold medal of honor was awarded to Dr. Pierre Chevenard for his outstanding contributions to metallurgical progress in the foundry industry. A gold medal of honor was also awarded to L. N. Shannon, past president of the AFS and president of the International Committee, for his lifelong devotion to the foundry industry, with special reference to his contributions to the training of young foundrymen, and to his co-operation with the International Committee.

President Shannon then made the presentation of the Award of Honor of the International Committee, founded by Commandatore Mario Olivo of Italy, to Prof. Albert Portevin. This was the third annual award. Professor Portevin was awarded the John S. Seaman Gold Medal at Atlantic City in 1952 and his reputation as a scientist and metallurgist is world-wide. President Shannon referred to M. Portevin's many contributions to the progress of the art of founding and said that the foundry industry had greatly benefited from his work. He mentioned some of his outstanding contributions and referred to the many honors and distinctions he had received, both in France and abroad. Professor Portevin is an honorary member of the American Foundrymen's Society.

Director General Belier made the closing speech and mentioned that the prosperity of the foundry industry depended, perhaps more than in most other industries, on the close relationship between executives, management and operatives. He also referred to the benefits received.

(*Continued on page* 270)

Use these temperature testing Tools!



Tips of Marshall Thermocouples can easily be replaced when worn out or burnt out.

Better control of pouring temperatures has been the secret of better castings for many nonferrous foundries. Careful checking of the melt both in the furnace and the ladle has eliminated underheating and overheating of metals.

Marshall Enclosed-Tip Thermocouples are the outstanding tools in this service. With Marshall Thermocouples you can measure temperature of your molten metals quickly, and with reliable accuracy. These Marshall instruments are built to give prompt readings, and to endure the hard service. L. H. Marshall Co., 270 W. Lane Ave., Columbus 2, Ohio.

MARSHALL
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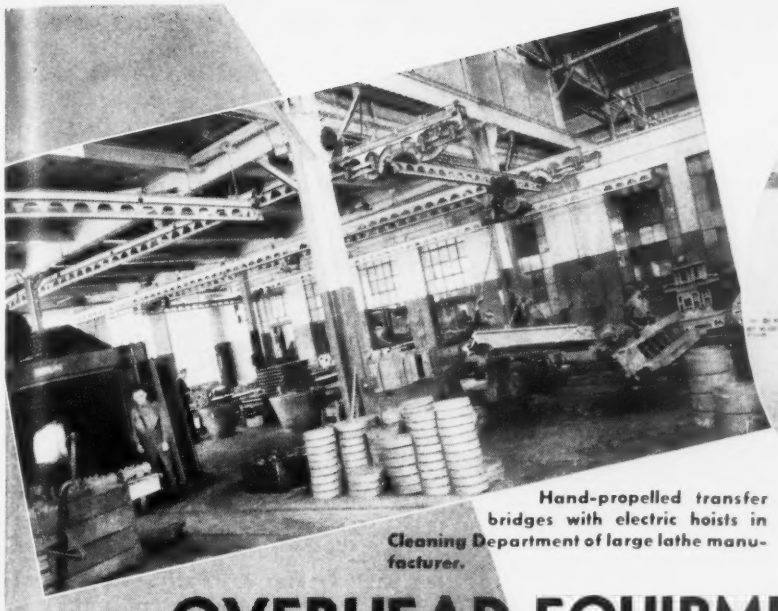
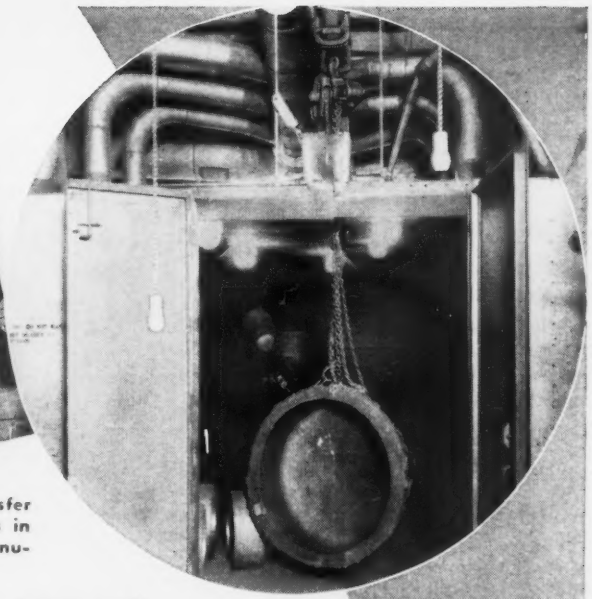
THERMOCOUPLES

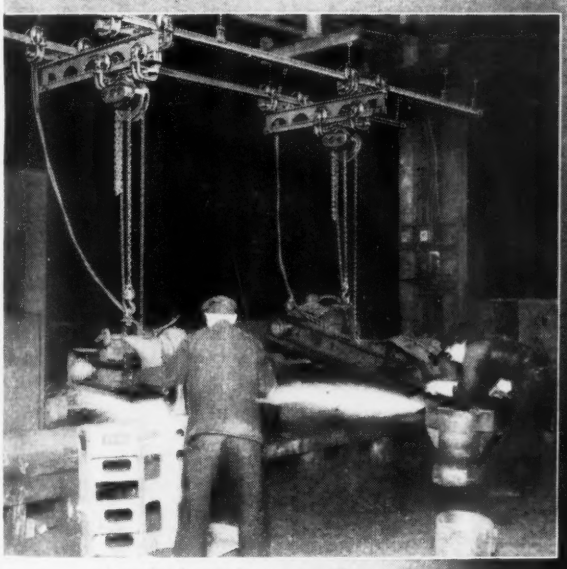


Hand-propelled transfer bridges with electric hoists in Cleaning Department of large lathe manufacturer.



Heavy castings are carried into chamber and supported on overhead tramrail during blast cleaning.

OVERHEAD EQUIPMENT *Operates Smoothly in* Abrasive Plants



Hundreds of short-span Cleveland Tramrail cranes are handling swing grinders in many plants.

In the cleaning departments where castings, forgings, billets, etc., are ground and blasted, will be found convincing proof of the design, workmanship and quality built into every piece of Cleveland Tramrail equipment. Here also is demonstrated the inherent correctness of locating materials handling facilities above and away from the floor where dust conditions are worst.

Despite blasting, piercing storms of grit, and atmospheres churning with penetrating abrasive dust, the equipment continues smooth and easy in operation — even after years of continuous service.

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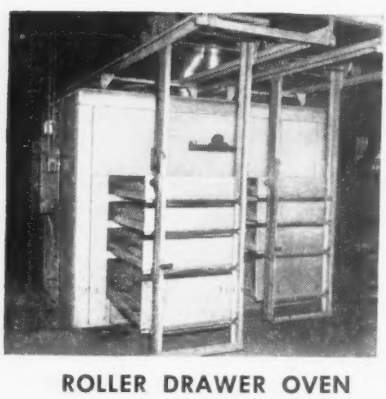
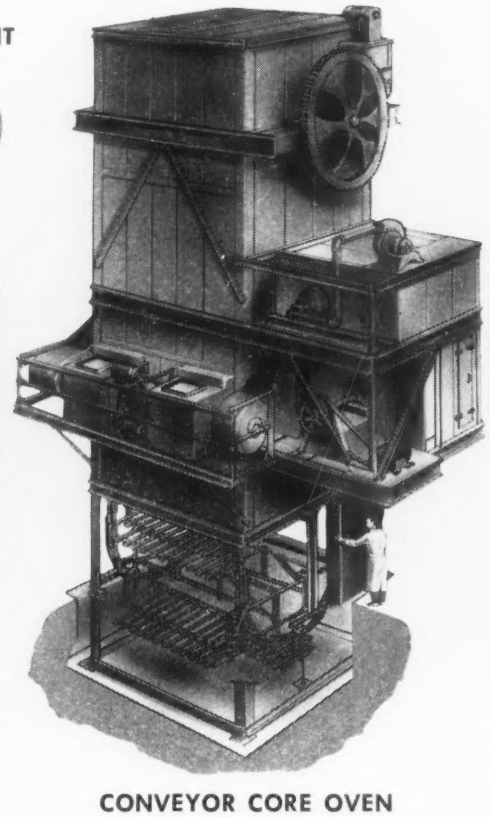


ROLLER DRAWER OVEN

CAR OR RACK OVEN



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Maximum volume of recirculated air provides a new high in *temperature uniformity* — *faster baking*—*elimination of hot spots*. Heaters and fans are self-contained within the oven structure — eliminating heat losses and field insulation—and saving floor space.

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(*Continued from page* 268)

thanks to the co-operation between the foundry associations of many countries achieved through the International Committee.

The congress program of social activities was notable on account of its artistic excellence. Special mention is due to the visit, on Sunday, Sept. 20, to the Chateau de Dampierre, at the invitation of the owners, the Duc and Duchess de Luynes. A specially prepared entertainment of ballet dancing had been arranged in the grounds of the chateau, and the visitors enjoyed the performance of star artists from the national theatre of the Opera Comique and from the Corps de Ballets des Champs-Elysees, of Paris; the orchestra was conducted by the conductor of the national Opera of Paris. Excursions were arranged for the ladies, including visits to Versailles and Fontainebleu.

Held Several Receptions

Other social activities of a more formal nature, but which helped largely to the friendly contacts that marked the congress, included a reception by President Paul Muguet and the Association Technique de Fonderie at the headquarters, rue de Bassano, on Saturday, Sept. 19; an official reception by the Municipal Council of Paris at the Hotel de Ville; a reception at the Paris Chamber of Commerce.

The afternoon of Friday, Sept. 25 was reserved for a visit to the new laboratories of the Centre Technique des Industries de la Fonderie at Sevres, near Paris. A description of these laboratories was given in FOUNDRY, December 1952. The visit was followed by a reception by director A. Le Thomas, on behalf of the Centre Technique and its president, Pierre Ricard.

The closing banquet was held on Saturday, Sept. 26, and was followed by a ball. President Shannon, speaking on behalf of the delegates of the member associations of the International Committee and associations from other countries, expressed heartfelt thanks to President Paul Muguet and all those who had co-operated with him in organizing this very successful congress.

As already mentioned, a large number of American foundrymen, many of whom were accompanied by their wives, attended the Congress. Tours of European countries had been organized by the AFS in three groups. The first group to arrive, with Dominic Meaglia, American Foundry Co., Los Angeles, as nominal leader, landed at Southampton and began their tour in Great Britain, leaving after

adjournment of the Congress.

The second group, with Samuel D. Russell, past president of the AFS and president of Phoenix Iron Works, Oakland, Calif., as nominal leader, arrived in Paris on Sept. 3, visited Italy and Switzerland, attended the Congress, then went on to Belgium, the Netherlands and Great Britain, and sailed back on Oct. 6. The third and largest group arrived in Paris for the Congress and followed up with a tour through France, Italy, Switzerland, West Germany, Belgium and Great Britain, returning from Southampton on Oct. 30. This group included the official AFS delegates.

A number of American visitors and their wives traveled independently, including Walter L. Seelbach, past president of the AFS and Mrs. Seelbach; Claude B. Schneible, president, Foundry Equipment Manufacturers Association, and Mrs. Schneible; Bruce L. Simpson, past director of the AFS and Mrs. Simpson; W. B. Wallis, past president, AFS and vice president, Foundry Equipment Manufacturers Association, and Mrs. Wallis; George W. Cannon, past director, AFS, and Mrs. Cannon.

Reports on technical papers given at the International Congress will be presented in next month's issue.

Spectrometers Improve Quality and Economy

Analytical control of alloy composition is one of the most important tools used in product control, and it is reported that 75 per cent of Aluminum Co. of America's 11,000,000 analytical determinations a year are performed on direct reading spectrometers. In addition to substantial reduction of analytical costs, use of such instrumentation has made large savings in production costs and resulted in significant improvements in quality control.

Celebrates 100th Year

Otis Elevator Co. is celebrating its 100th anniversary this year, looking back on a century in which it installed more than 160,000 passenger and freight elevators in buildings around the world. The first was installed in 1853 in a furniture factory in New York at a cost of $300, "exclusive of belts and chains," had a capacity of 1500 lb and traveled at the rate of 40 fpm.

Almost 80 years later, the firm installed 58 high-speed elevators in the Empire State Building at a contract cost of nearly $3 million. These elevators have a capacity of 5000 lb each and travel at 1200 fpm.

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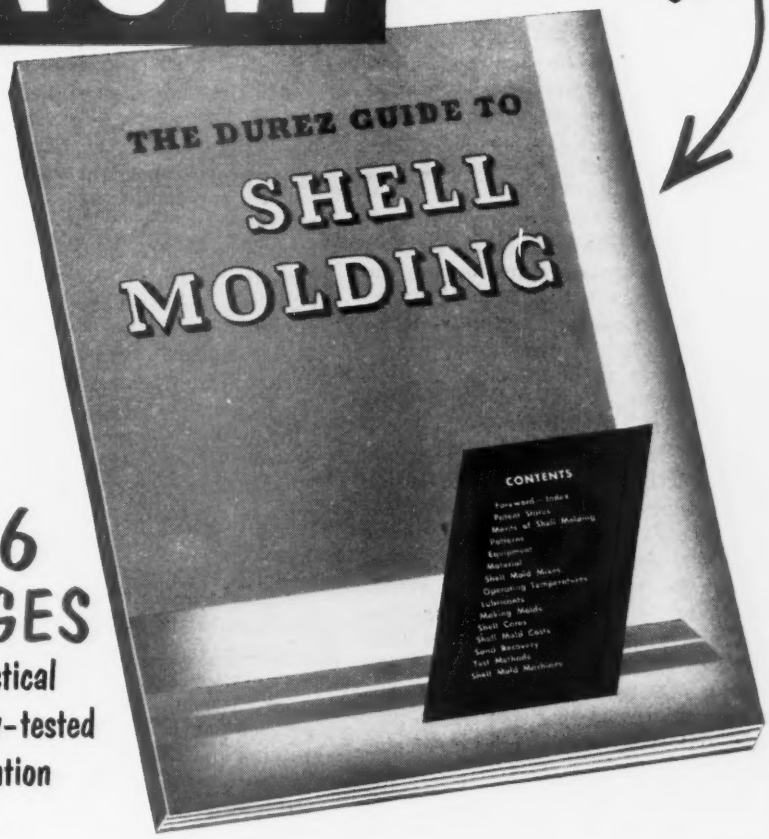

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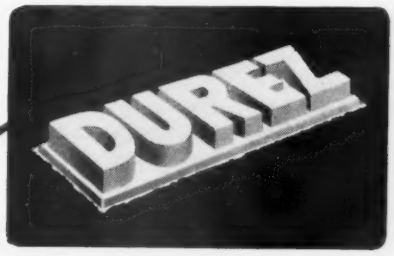

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OHIO CHAPTERS OFFER VARIED PROGRAM

At Sixth Regional Conference in Cincinnati

By EDWIN BREMER
Metallurgical Editor
and JACK C. MISKE
Assistant Editor

SIXTH Ohio Regional Foundry Conference was held at the Netherland Plaza hotel, Cincinnati, on Sept. 24-25, with 250 in attendance. Host was the Cincinnati Chapter, American Foundrymen's Society, and the participating chapters included Central Ohio, Canton - Massillon, Northeastern Ohio, and Toledo.

The group was welcomed by Dean C. A. Joerger, University of Cincinnati, who pointed out that the excellent co-operative spirit during the last few years between the foundry industry and colleges and universities was mutually advantageous, providing a better understanding of each other's problems as well as a more effective interchange of services.

Dr. M. F. Browne, Libbey-Owens-Ford Glass Co., Toledo, O., spoke on uses of plastics, describing application of urea and phenol formaldehyde resins in cores and shell molds. For cores the resins are water soluble types while for shell molding they are not. Liquid resins also are used for casting of patterns, coreboxes and fixtures. Polyester resins in conjunction with glass fiber are being used for patterns, coreboxes and core driers.

Plastic for Core Driers

A recent development is the combination of glass fiber and alkyd resin which possesses high strength and dimensional stability. Material must be formed by pressing, and is being used for making core driers. Other resin applications mentioned by Dr. Browne include impregnation of castings to eliminate leakage, impregnation of plaster patterns, etc. to obtain a hard, strong part, and as a sand bond for high-pressure molding.

At a luncheon meeting, with E. M. Durstine, Keener Sand & Clay Co., Columbus, O., presiding, Frank Dost, Sterling Foundry Co., Wellington, O., and vice president, AFS, described the widespread activities of the society to improve the quality of castings, and widen the applications. He also stated that benefits of membership in the organization were in direct proportion to participation in its activities, and urged all to take part in them. Hans Heine, technical director, AFS, spoke briefly on the technical phases of the society, and said that present outlook indicated a well-balanced and interesting array of papers for the annual convention and exhibition to be held in Cleveland in May, 1954.

At the conference dinner S. E. Kelly, Eberhard Mfg. Division, Eastern Malleable Iron Co., Cleveland, presided. Edward McFaul was the speaker and presented an amusing and interesting dissertation on human relationship. Closing luncheon, under the direction of William Oberhelman, Oberhelman-Ritter Foundry Co., Cincinnati, had Liston Tatum, International Business Machines Corp., as speaker. He described the application of electronics to calculating machines used to solve lengthy and highly involved mathematical problems, and showed a motion picture film, "Piercing the Unknown," which details applications of such machines.

Gray Iron—First of four sessions on gray iron was under the direction of R. A. Epps, Stoller Chemical Co., Alliance, O., with Alexander D. Barczak, Superior Foundry Inc., Cleveland, as speaker. He discussed the importance of quality control in obtaining castings to meet customer requirements, and described the various means for quality control. Those include checking of patterns, gating and equipment prior to placing in production and during operation. Also the testing of various raw materials such as sands and irons previous to use, and maintenance of regular routine checks during use.

Core sand mixes are tested daily for various properties, and molding sand tests are run hourly. In melting, chill tests are made every 15 minutes, and hourly tests are made for carbon and silicon, with complete analysis once a day. Castings are taken from the production line every hour and cleaned and inspected for defects. Records kept of the various observations indicate the trends of the several variables, and suitable adjustments can be made in practice before the particular variable gets out of hand.

Second session, with Alexander Prentice, Stark Foundry Co., Canton, O., presiding, had Robert H. Zoller, Zoller Casting Co., Bettsville, O., as speaker. His topic was "A New Era in Melting," and he described the work at his foundry in improving cupola melting operations. Further details on the subject were published in an article, "Drops Cupola Bottom Once a Week," presented in the September issue of FOUNDRY.

Ernest Lancashire, Union Metal Mfg. Co., Canton, O., was chairman of the third and fourth gray iron sessions. Discussing "Practical Cupola Control" at the third session, D. E. Krause, Gray Iron Research Institute, Columbus, stressed that effective operation requires good cupola care and maintenance, and he enumerated some of the points which often are neglected. These include watching for leaks, keeping tuyeres tight, checking lining and refractories after heats to keep proper diameter, maintaining proper venting and avoiding use of wet patching. Scrap should be sized and the nonferrous material taken out. Coke should be well distributed and not less than 2 in. in diameter. Since it is important to know metal temperature to within 10-20 degrees, optical pyrometers should be used, usually about every 10 minutes.

Whip Some Problems

At the fourth session, T. E. Eagan, Cooper-Bessemer Co., Grove City, Pa., speaking on "Practical Aspects of Nodular Iron," recounted some of his company's experiences in producing nodular iron castings. Problems include dross (or cope side defect) and pinholes. The pinhole problem has been beaten by his company in green sand molding, although Mr. Eagan was not at liberty to divulge details, but the dross problem has not yet been solved. Annealing, which materially improves ductility, is done for 2-5 hours at up to 1580° F, with furnace cooling to 900° F, followed by air cooling. Weldability is closer to that of gray iron than of steel, even with Ni-Rod 55. Heavy sections give more trouble than light ones.

Malleable Iron—At the first two of the three malleable iron sessions, Joseph Bailey, GHR Division, Dayton Malleable Iron Co., Dayton, O., was chairman. Milton Tilley, National Malleable & Steel Castings Co., Cleveland, spoke at the first session on "Electric Furnaces Annealing of Malleable Iron" and outlined advantages and disadvantages of the process. Advantages include close control of heat, formation by electric furnaces of their own nonoxidizing atmospheres, less casting warpage and a minimum of dead tonnage to heat and to cool. Disadvantages include relatively high installation and fuel costs and the need for higher grade supervision and operators.

(Continued on page 274)

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THERMOTOMIC "HOTOP" LIQUIDIZER

Exothermic Carbon Free Liquidizer For Iron, Steel, Nodular Iron

This new head compound saves feeding metal in risers or feeding heads which can now be reduced in height 40 to 70%

SOFFEL'S THERMOTOMIC HOTOP CARBON FREE LIQUIDIZER is different from other head compounds in that HOTOP LIQUIDIZER does NOT contain powdered metal, is NOT a thermit compound. It is a patented exothermic compound entirely free of carbon, sulfur and phosphorous and can be used without danger of contamination on any ferrous metal or alloy.

HOTOP LIQUIDIZER also saves molding time as less sand is needed in the mold cope due to short height of risers. HOTOP LIQUIDIZER produces a liquid slag well over 4000° F. of heat and insulates the metal. The feeding metal will remain liquid at least 50% longer assuring adequate feeding while the casting cools and solidifies. Piping and shrink cavities caused by premature freezing of the feeding metal are eliminated.

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SOFFEL'S EXOTHERMIC CARBON FREE LIQUIDIZER is the leader in major foundries for use on both ferrous and non-ferrous metals and also in ingot production. It is the original scientific non-carbon, exothermic compound for feeding heads and risers.

When applied on the heads or risers CARBON FREE LIQUIDIZER reacts within itself exothermically, producing a temperature above 3200° F. It actually increases the temperature of the feeding metal to a point well above that of the metal in the main body of the casting, thus ensuring that the feeding metal will be the last to freeze. In this manner, shrink cavities in the casting caused by premature freezing of the feeding heads will be eliminated. After the exothermic action has ceased, the LIQUIDIZER forms a soft refractory insulating blanket on the metal. This confines the heat generated by the LIQUIDIZER and aids in maintaining the desired high temperature of the feeding metal in the heads or risers.

SOFFEL'S THERMOTOMIC COMPOUND
PATENTED
FOR ALL METALS and ALLOYS

THERMOTOMIC COMPOUND is a patented Exothermic compound that can be molded into any desired shapes and used as feeding ring inserts under risers or as facing application where it is desired to maintain fluidity of the casting metal. THERMOTOMIC permits reversal of the trend towards large feeding heads and risers, making it possible to use heads that are shorter and more compact with 1½" feeder openings. This permits easy removal of the casting feeding heads and sharp reductions in cleaning and finishing costs. When THERMOTOMIC is used as inserts or as facing mixed with molding sand in the mold, heat at thin metal sections is retained until the thick main body of the casting has solidified, thus eliminating shrink cracks and improving grain structure and tensile strength. For use in green sand molds, use THERMOTOMIC W. P. (Waterproofed)

NOTE: SOFFEL'S CARBON FREE LIQUIDIZER NO. 5 is recommended for use on top of feeding heads in conjunction with THERMOTOMIC COMPOUND. For aluminum castings, use THERMOTOMIC ABC and AL-X31 LIQUIDIZER. When ordering a trial sample, advise the kind of metal to be used on.

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(*Continued from page 272*)

Speaker at the second session was Harry M. Crow, General Grinding Wheel Corp., Cleveland, whose subject was "Proper Testing and Evaluation of Grinding Wheels." Mr. Crow noted that only through the co-operation of foundries can wheel manufacturers develop better wheels which will cut grinding costs; for such co-operation to be meaningful, foundries conducting tests on new wheels should set up standards for comparison. Test reports that merely say a wheel is too soft or too hard are not adequate.

Three factors, he said, form the foundation of any wheel test: (1) Weight, either in pounds or tons of castings ground or in pounds of metal removed; (2) time, in minutes or hours it takes to grind the weight involved; (3) cubic inches of wheel in terms of number and cost for weight or for a period of time. These factors must be calculated accurately.

Speaking at the third malleable session, under the chairmanship of Robert Mayer, Haven Malleable Iron Co., Cincinnati, J. E. Dvorak, Eberhard Mfg. Co., Division of Eastern Malleable Iron Co., Cleveland, discussed practice and control of duplex melting of malleable iron, confining his remarks to the cupola-air furnace system of duplexing. Sizes of cupola and furnace should, he stated, be in proper proportion to each other. Size of the air furnace depends both on the tonnage of finished metal required and on the carbon content desired in the metal. Most of the success or failure of a duplexing operation in production of uniform metal rests with the operation of primary melting, in the cupola.

Steel Castings—First two sessions on steel were under the direction of Robert A. Willey, Commercial Steel Casting Co., Marion, O. Speakers were Clifford E. Wenninger, National Engineering Co., Chicago, and Frank Kiper, Ohio Steel Foundry Co., Lima, O. Mr. Wenninger proposed that molding sand be considered from the viewpoint of the ceramist who practices sizing of his materials to obtain what is termed orderly packing. He explained that in molding sand it simply means selection of grain sizes so that smaller rounded grains would fill the voids between larger ones. As a part of the concept Mr. Wenninger stated that intensive mulling of the sand is required to arrange the sand grains so that they will pack properly when rammed in the mold.

Mr. Kiper, in discussing the social significance of the foundry industry, pointed out the changes in industrial conditions since 1850 when work was drudgery. During that period working time has been reduced from 72 hr per week to 40 hr, but output of goods has increased three and one-half times. Both of those resulted from application of mechanical and other devices which in a large degree eliminated fatigue.

At the third session Ray Meyer, Ohio Steel Foundry Co., Springfield, O., presided and G. J. Grott, Unitcast Corp., Toledo, O., spoke on pH value of sand. Defined as the hydrogen ion concentration, pH indicates the basicity or acidity—water being neutral with a pH of 7. Acidity increases with pH descending from 7 while basicity or alkalinity increases with pH ascending from 7.

In many cases increasing the pH of molding sand by addition of sodium carbonate, sodium hydroxide, etc., improves physical properties such as flowability, permeability, strength, etc. According to Mr. Grott, pH of bentonite-bonded sands should be above 8, and in his foundry the value is determined by a pH meter. Adjustments to bring the sand to the

(*Continued on page 276*)

DOES BERYLLIUM COPPER MAKE A GOOD SAND CASTING ALLOY?

How would you react to the statements below?

BERYLLIUM COPPER IS INEXPENSIVE TO HANDLE

Quite true. The low pouring temperature of beryllium copper (nearly 1000 degrees less than that of steel) greatly simplifies foundry procedure. Makes it easier to handle, too. Foundrymen say molding and gating techniques are similar to those for the bronzes.

BERYLLIUM COPPER SAND CASTINGS ARE ONLY USED FOR ELECTRICAL EQUIPMENT

Dead wrong. While it is true that high conductivity makes Berylco beryllium copper ideally suited for heavy electrical and electronics applications, the machine tool, ordnance and marine industries—to name a few—make good use of Berylco sand castings. Berylco's chief advantage lies in its excellent fluidity, which makes possible intricate "as cast" detail, reduces machining, and gives the designer greater freedom.

IT'S HARD TO MACHINE BERYLLIUM COPPER

A misconception. High-strength Berylco alloys can be readily machined as cast or in the annealed soft condition, then hardened by a simple low-temperature heat treatment. High-conductivity alloys can be easily machined in the fully heat-treated condition.

BERYLLIUM COPPER SAND CASTINGS HAVE HIGH FINAL PROPERTIES

And how! The heat-treatable feature of Berylco beryllium copper offers a combination of high final properties impossible to get in any other material. Through age hardening, Berylco castings attain a high degree of strength and hardness—tensile strength of 180,000 psi, Rockwell hardness of C43, Brinell hardness of 425 in some alloys, or conductivity as high as 50 percent in others.

BERYLCO BERYLLIUM COPPER CASTING ALLOYS are available in convenient ingot sizes. For a complete listing of available alloys and forms, send for your free copy of the recently published *Product Directory*.

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Communist machine-gun fire dropped him in combat. But whole blood kept him alive, saw him through the hospital. He thanks you for his life.

She'd been exposed to polio. A new serum, *Gamma Globulin*, made from blood, helped ward off the dread disease. She thanks you for her life.

A tornado whipped suddenly across her home town. She was badly injured by falling debris. But a quick operation, several transfusions pulled her through. She thanks you for her life.

Three grateful people say: "we're HERE... because you were THERE!"

Each one of these people is alive today because someone gave blood.

If you've given blood before, you know how easy it is—how quick and painless. And you know what a wonderful feeling it is when you realize that what you've done may give another person his life.

Now you are asked to give blood . . . again and again. And you can do it safely every 3 months.

Because America's need for blood has increased enormously—for our armed forces, for accident and disaster victims at home, for new disease-fighting serums.

Many a life hangs in the balance! Will you help? Call your Red Cross, Armed Forces or Community Blood Donor Center today!

BUSINESS EXECUTIVES CHECK THESE QUESTIONS

If you can answer "yes" to most of them, you—and your company—are doing a needed job for the National Blood Program.

- ◯ HAVE YOU GIVEN YOUR EMPLOYEES TIME OFF TO MAKE BLOOD DONATIONS?
- ◯ HAS YOUR MANAGEMENT ENDORSED THE LOCAL BLOOD DONOR PROGRAM?
- ◯ HAS YOUR COMPANY GIVEN ANY RECOGNITION TO DONORS?
- ◯ HAVE YOU INFORMED EMPLOYEES OF YOUR COMPANY'S PLAN OF CO-OPERATION?
- ◯ DO YOU HAVE A BLOOD DONOR HONOR ROLL IN YOUR COMPANY?
- ◯ WAS THIS INFORMATION GIVEN THROUGH PLANT BULLETIN OR HOUSE MAGAZINE?
- ◯ HAVE YOU ARRANGED TO HAVE A BLOODMOBILE MAKE REGULAR VISITS?
- ◯ HAVE YOU CONDUCTED A DONOR PLEDGE CAMPAIGN IN YOUR COMPANY?
- ◯ HAVE YOU SET UP A LIST OF VOLUNTEERS SO THAT EFFICIENT PLANS CAN BE MADE FOR SCHEDULING DONORS?

Remember, as long as a **single** pint of blood may mean the difference between life and death for **any** American . . the need for blood is **urgent!**

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Photo courtesy of Supreme Brass & Aluminum Foundry, Los Angeles, Calif.

Shown here is a match plate converted from 3 loose patterns through the use of Tamastone Pattern Compound. A typical method which will enable a foundry to turn out from 600 to 1000 molds or more. Your men can make this pattern equipment right in your own foundry at a minimum of cost.

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for Better Melting

(*Continued from page* 274)

desired value are made by addition of small amounts of soda ash at the muller when the sand is being conditioned. He said that with pH control using five tests during the morning and a similar number in the afternoon, sand troubles had been reduced to 0.1 per cent.

Concluding steel session, with C. T. Greenidge, Battelle Memorial Institute presiding, dealt with shell molding. Speaker was Warner Bishop, Archer-Daniels-Midland Co., Cleveland, who described the "D" process which uses an oil-sand mix blown into the space between a contoured drier and a pattern. Oil employed is a specially processed type. After blowing the shell remains in the drier, and is baked for 20 to 30 minutes. Driers can be contoured to provide different thickness of shell at various points, or to produce supporting or stiffening ribs on the back. Only one pattern is required, but sufficient driers must be available to meet production demands. Procedure is said to produce castings with close dimensional tolerances.

Discuss Nonferrous Operations

Chairman of the first two nonferrous sessions was Richard B. Kling, Magnus Brass Division, National Lead Co., Cincinnati. First session heard Clyde E. Small, Campbell Hausfeld Co., Harrison, O., speak on "The Selection and Care of Nonferrous Melting Furnaces." He recommended that furnaces be located apart from the rest of the foundry, against a blank wall, with windows in the opposite wall. A high roof reduces fire hazard and helps ventilation.

Selecting a furnace, foundrymen should consider diversity of product, adaptability of the equipment, quality of metal, working conditions and investment and operating costs. Each of the many types of furnaces used in nonferrous melting has definite applications for which it is best suited, and misapplication of equipment can cause great trouble and expense. Crucible furnaces, particularly of the stationary type, offer great flexibility and can be relied upon consistently to yield metal of high quality, Mr. Small stated. Proper care of equipment involves a lengthy list of dos and don'ts, but the key point to remember is the need for systematic, careful attention to the obvious. Most problems are traceable to neglect or carelessness.

"Development of a General Purpose Nonferrous Synthetic Sand," the paper at the second session, was delivered by William Ball, Hill & Griffith Co., Cincinnati, whose co-author is Frank Robinson, Jeffrey Mfg. Co., Columbus, O. The paper

concerned a sand developed at Jeffrey Mfg. Base is a bank type sand which averages 100 AFS fineness and has a four screen distribution. It is bonded, by weight, with 1½-2 per cent bentonite and 2 per cent proprietary compound. All additives are mixed in a shop-sized muller. The same base sand should be used in coreroom and foundry when possible.

Sand must be mulled and should be rammed hard—in the high 80s or low 90s. Riddling it on the pattern is recommended. It eliminates other sand and minimizes casting defects, including scabs, swelling and penetration. Finishes are generally better, although some compromises are necessary, particularly with aluminum, with which natural sand still is used when finish must be very smooth.

Third nonferrous session, under the direction of Walter Klayer, Aluminum Industries Inc., Cincinnati, was devoted to a showing of the sound motion picture "Effect of Gating Design on Casting Quality," which was prepared under the auspices of the Aluminum and Magnesium Divisions of the American Foundrymen's Society.

Concluding session was a round-table discussion on quality control and scrap reduction in copper-base alloy castings. Chairman was William M. Ball Jr., R. Lavin & Sons Inc., Cincinnati, who was assisted by a panel composed of J. S. Schumacher, Hill & Griffith Co., Martin Dietl, Schnaible Co., and Walter Klayer. It was pointed out that knowledge of the characteristics of the various alloys is important relative to melting and gating. Those characteristics include tendency to pick up gases, to form drosses, etc., and with such knowledge adjustments can be made in practice to minimize their effects.

College Color Film Sells Engineering as Career

A 20-minute film in color about training, job opportunities and the future in the field of mechanical engineering has been released by the School of Engineering at Michigan State College. Entitled "Mechanical Engineering," the film is designed primarily for showings before high school groups interested in engineering careers. It includes scenes of training on the MSC campus and of professional engineers at work in Michigan industrial plants.

Producers are Paul DeKoning, assistant professor of mechanical engineering, and George Tsuda, instructor in engineering drawing. The film will be shown to interested groups without charge.

LOW IN PRICE ... HIGH IN PERFORMANCE

Series "D" 'Load Lifter'® Cranes

STANDARDIZED, MASS PRODUCED **Series "D" All-Electric 'Load Lifter' Cranes are today's most advanced cranes for average industrial needs. No other crane built for the same service is available at the low prices of the 'Load Lifter'. Every type and capacity has design and construction advantages like those engineered into all "Shaw-Box" Heavy-Duty Cranes.**

DEPENDABLE PERFORMANCE **is the only measure of any crane's value. Series "D" 'Load Lifter' Cranes do not whip and skew, because three girder bridge construction assures maximum rigidity. The bridge and trolley wheels are fixed on axles that rotate on anti-friction bearings. Sealed housings protect all gearing and confine the oil in which it operates. Maintenance is minimized. Every practical use is made of ball or roller bearings for smooth, efficient service. Spotting is easy and accurate. Safety devices protect man, load, and crane completely.**

CAPACITIES FROM 1 TO 20 TONS **— three basic types and three trolley styles — are offered in the Series "D" 'Load Lifter' Cranes. Pendant-type push-button control is standard on floor-operated cranes; master switches are provided in cage-controlled cranes. Every capacity, type and style can be selected from Catalog 221. Write for a copy.**

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Builders of "Shaw-Box" and 'Load Lifter' Cranes, 'Budgit' and 'Load Lifter' Hoists and other lifting specialties. Makers of 'Ashcroft' Gauges, 'Hancock' Valves, 'Consolidated' Safety and Relief Valves, 'American' Industrial Instruments, and Aircraft Products.

The Importance of Carbon In the National Defense—*A Fable*

Of course, the following was not actually received from the Pentagon. However, many who have wandered through the Washington maze would not be at all surprised to learn that it (or an equally serious document) is only awaiting final approval somewhere.—The Editors.

IT is suggested that the problems relating to carbon in iron, steel and other alloys important to the national defense have been greatly overlooked in logistics planning. It appears that critical shortages of what might be termed metallurgical carbon presently exist. Study of these shortages should be conducted in several areas of industrial activity:

A. Determination of the proper distribution in:

1. Cast iron
2. Cast steel
3. Wrought iron
4. Wrought steel
5. Rolled steel
   (a) Hot
   (b) Cold
6. Stainless steel
7. Carbon steel
8. Alloy steel, with and without carbon
9. Superalloys
10. Carbonyl iron
11. Carbonyl nickel
12. Others
13. Etc.

B. Determination of the essentiality

C. Improvement of manufacturing processes

D. Research programs

E. Supply expansions necessary for meeting mobilization needs.

Discussion—Reference to current specifications, both commercial and government, indicates that tacit admission exists of the maldistribution of available carbon, especially in the ferrous or iron-base alloys. It appears that within the conventional SAE or AISI steels, some standardization of both carbon content and range of permissible carbon content is required. For example, carbon content may be anywhere from 0.06 to 1.03 per cent C in the "carbon" and alloy steels and from 0.03 to 1.03 per cent or higher in the stainless steels.

Further, within this broad band, intra-range variations may be found from as low as 5 "points" of carbon (to use the technical terminology) to as many as 13 points, indicating what may be termed industrial reluctance to adopt closer, less wasteful limitations. It must be pointed out that many government specifications generally have long recognized the need for conservation by limiting the permissible ranges to as low as 3 points.

Analysis of past production records reveals more startling data. In the so-called "carbon" steels, only 31.416 of total tonnage is less than 0.20 per cent C; in the constructional alloy steels, 63.4 per cent contains over 0.15 per cent C; in stainless steels, 99 per cent contain less than 0.35 per cent C. Review of the specifications in the light of these production figures shows even more clearly the extent to which American industry has been manipulating distribution.

Particularly in the stainless steels is this situation already acute, where in two grades (AISI 304L and 316L) it has been necessary to arbitrarily establish a maximum of 0.03 per cent C! This, in addition to the fact that 99 per cent of the stainless steel production contains less than 0.35 per cent C, clearly provides an indication of the gravity of the situation, leading to the inevitable conclusion that carbon is in such short supply that there is only enough for more than 0.35 per cent in but 1 per cent of that segment of the industry's entire production! The effect is not so pronounced in the carbon and alloy steels but this is probably because of longer experience and perhaps more determined conservation efforts.

The industry has long been aware of the importance of carbon. Reference to the technical literature discloses that many papers have been written on control of carbon, cat ing carbon coming down, determin tion of carbon, the "iron-carbon" d gram, etc. Further, the industr has long been concerned over some of its own waste of this valuable element. Frequent studies have been made with a view to elimination of the so-called "sigma phase" (chromium carbide), especially in the heat-resistant alloys; cementite or iron carbide has been studied extensively, resulting in the development of "pearlite" which saves iron carbide by use of alternate layers of cementite and ferrite (ferrite is cementite without carbon).

Tungsten carbide appears to have some highly desirable properties for which it may be necessary to allocate carbon in the event of all-out war, particularly for metal-removing alloy and AP shot cores; in this latter respect, investigation appears to be needed to evaluate the possibilities for large-scale use by converting the undesirable chromium carbide (sigma phase) and iron carbide (cementite) into tungsten carbide for this military need. This should not be too difficult, representing a simple matter of substitution or replacement, according to the equations:

(1) $Fe_3C + W = WC + 3Fe$

(2) $Cr_3C + W = WC + 3Cr$

Consuming Industry Practices—The consuming industry is generally more favorable toward conservation of carbon than are the producing industries, although it is quite likely that this

(Continued on page 280)

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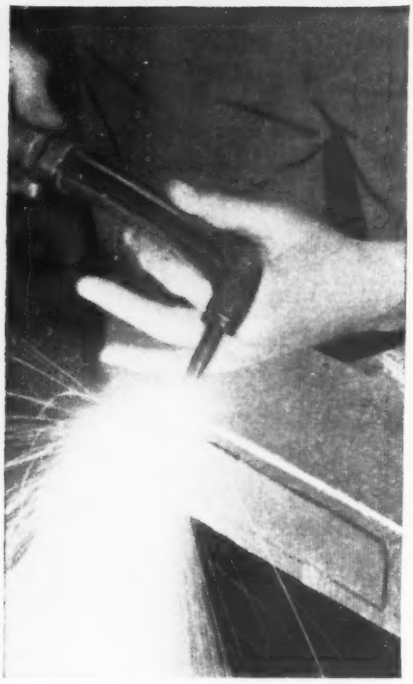

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THE MARK OF QUALITY — MARKAL

(*Continued from page* 278)

attitude has been forced by the producers' control of the carbon supply. Common practice among some consumers is to avoid the use of the costly and hard-to-obtain high-carbon steels by employing steels at the 0.10/0.20 per cent C level and then adding carbon to the surface only. This practice, called "carburizing" is capable of quite close control so that the higher carbon (up to 1.00 per cent) is deposited in a very thin skin or "case" as it is frequently termed.

Other and more progressive industrial activities have been able to avoid the use of even that small amount of carbon for surface conditioning by development of a practice called "nitriding" which imparts identical surface lattices or paramaters through the use of nitrogen gas. Since the earth's atmosphere contains considerable nitrogen in the air, it may prove desirable to issue mandatory controls that only the nitriding process may be used. Preliminary investigations indicate that the appropriate agency should conduct studies in this industrial area since prices charged for nitriding items seem to be at conflict with the philosophy that the air is free. Clearance with the Department of Justice will also be free. Clearance with the Department of Justice will also be required in order that the rights of individuals to obtain air are completely protected.

Producing Industry Practices—The producing industry is guilty of certain practices which have undoubtedly brought about the limitations mentioned previously. The most flagrant violations occur in the steel plants. The carbon content of iron ore is practically zero or less but the steelmakers put a lot of carbon into their blast furnaces and make pig iron, basic pig, that is, which contains around 3.75 per cent C. Then—due no doubt to careless operating controls—the steel ends up with much less carbon, as reported previously. If their manufacturing practices could be improved, more of that 3.75 per cent C would be available for raising the carbon levels of many steels. A certain amount of doubt exists that they really need to put carbon into their pig iron. Attention is invited to the really creditable performance of the aluminum industry—there is NO carbon in their pigs!

Some of the less responsible members of the producing industry are reported to frequently attempt to save carbon by shipping materials with less carbon than was ordered by the customer. Reliable sources state that this practice of delivering decar-

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burnized bars is bitterly resented by the consuming industry.

Foundry Practices — In the field of cast materials, similar imbalances are to be observed but in a more sinister manner. There are but two general classes of ferrous castings, iron and steel. The Gray Iron Founders' Society has been so successful in obtaining a grip on the carbon market that *all* of its members are able to produce products containing more than 3.00 per cent C while the members of the steel castings industry are forced to get along with a maximum of 1.70 per cent C; actually, more than 80 per cent of the entire steel castings production contains only 0.50 per cent C or less.

Recent reports of shortages in capacity for production of steel castings, particularly for tank armor, probably can be identified with the carbon situation. It may well be that these shortages could be corrected by issuing a directive that the gray iron foundries make steel castings.

Recommendations — It is strongly recommended that:

1. Basic supply/requirements studies be undertaken promptly.
2. Proper conservation directives be prepared for the military.
3. Stockpile objectives be established.
4. A Joint Inter-Departmental Carbon Conservation Committee be formed.

General Motors Promotes Good Public Relations

General Motors Corp., Detroit, is distributing a 32-page guidebook called "GM Lives Here," which lists 67 typical case examples of different things GM plant management has done to earn the respect and confidence of its neighbors. These include heating a hospital during a coal strike, grading and equipping a school playground, building Little League baseball diamonds, furnishing trucks for local salvage campaigns and many other actions designed to build good relationships in local communities.

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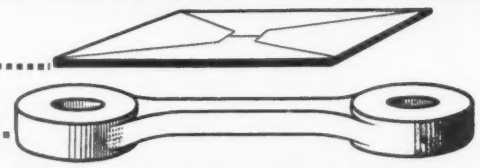

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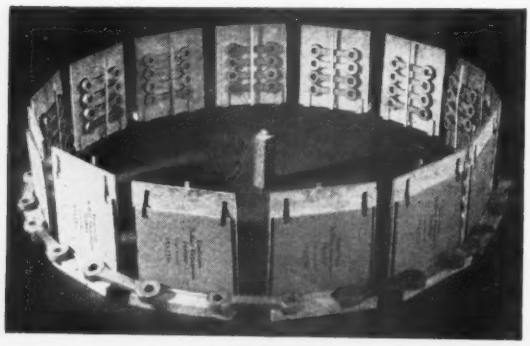
Illustration shows 60 steel castings being photographed simultaneously. The gamma rays, flying in all directions, go through all the castings at once, making 60 exposures of the 60 castings



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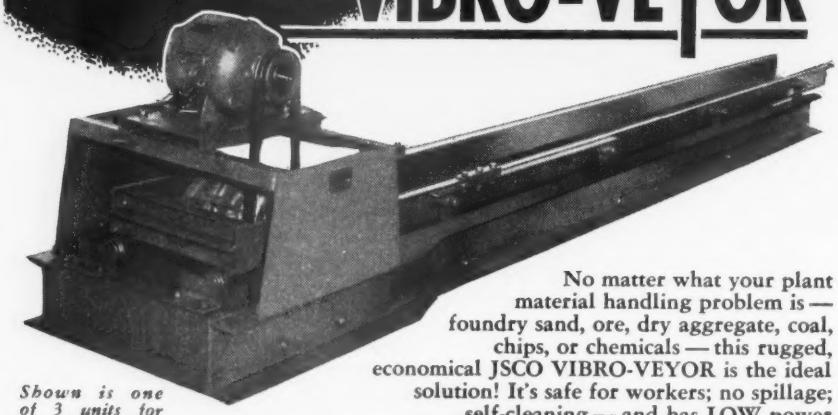

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Large Wood Patternmaking

(*Continued from page* 105)

sions to determine methods of construction, molding, and core making. Scale or full size models of patterns of complicated design aid in determining core or parting arrangement, and aid the design engineer in making a decision on other points which may have caused him concern during the drawing board stage.

Because of the long period of time required to make the molds for large castings, these patterns are subjected to severe usage and hence require the ultimate in construction and materials. Heads or braces which form the backbone and ground work for the pattern are laminated with at least three courses or layers, well glued and nailed. In many cases the courses are screwed together. Two courses, which are used by many pattern shops, are no better than a single course and will no better stand the terrific strain applied when drawing the pattern from the sand.

Build Steel Straps into Pattern

It is necessary to build heavy steel lifting straps into the inner structure of these patterns which extend the entire depth of the job to be hooked under the drag side of the braces and secured with heavy lag screws. These straps are securely boxed in on all sides to prevent them from tearing loose during lateral strain caused by the long, angular stretch of the crane chains.

A few large molds are made of all green sand, requiring a shell or skeleton pattern. A skeleton pattern is usually a low cost and low activity pattern. In a few instances, this type of pattern is used to make the largest castings when cores of great size are otherwise required. This type of pattern is used sparingly due to its comparative fragility. They are difficult to handle and are easily damaged, thus causing considerable expense in maintenance and repairs. Also, if these patterns become very active, they must be replaced by solid patterns and coreboxes.

The coreboxes for large patterns are often larger than the patterns themselves. They must be easy to handle both in the coreroom and pattern storage and yet they must be built to withstand the ramming of the core. Consequently, these boxes are usually disassembled in the coreroom to facilitate core removal. Strength requirements are met by extending long bolts the full width of the box.

Cores too large for the core ovens are rammed on the molding floor and dried there by gas burners improvised

for each core. This method, although expensive, has the advantage of eliminating handling between coreroom and molding floor, thereby lessening breakage.

Shellac May Be Troublesome—Shellac, commonly used by pattern shops as a surface coating, is not satisfactory for most large operations. When it is necessary to leave patterns in the sand for one week or longer, the shellac has a tendency to become tacky, causing the pattern to adhere to the sand. In drawing, it is a frequent occurrence to bring large sections of the mold along with the pattern if shellac is used. Sometimes, the pattern sticks so firmly that it becomes badly damaged before it can be removed from the sand.

A special pattern lacquer has been developed by Westinghouse's Trafford foundry and the supplier. It forms a hard, smooth covering that resists the softening effect of the moisture and other ingredients in the sand, allowing a clean draw of the pattern from the mold.

In producing patterns for small and medium-size castings, the method of construction and types of patterns required are somewhat different. Accuracy of dimension and appearance are more important with this type of pattern than with those used to make large and heavy castings. In making these patterns, a comprehensive knowledge of the operation of various types of molding and coremaking machines is essential. Usually, such a knowledge is acquired through years of experience.

Patterns made for bench or floor molding, while not intended for high activity, are nevertheless expected to be constructed in such a way that they are available for many years of low production requirements. They should also be substantial enough to withstand considerable handling and abuse due to hand ramming or even slinger action. Cost of future maintenance and replacement are to be considered in the primary design stages and the patterns constructed in such a manner as to minimize these factors.

Long-life, low-activity patterns are constructed with a minimum of loose pieces and hand-cut partings. Cores are substituted for deep pockets in the parting to save time in the molding and to eliminate the expense of pattern repairs and reconstruction. These patterns are often mounted cope and drag even though they are hand rammed. This, in turn, permits the construction of a more substantial pattern which will produce a more accurate casting at lower cost.

Many of the patterns for medium size castings are constructed for high

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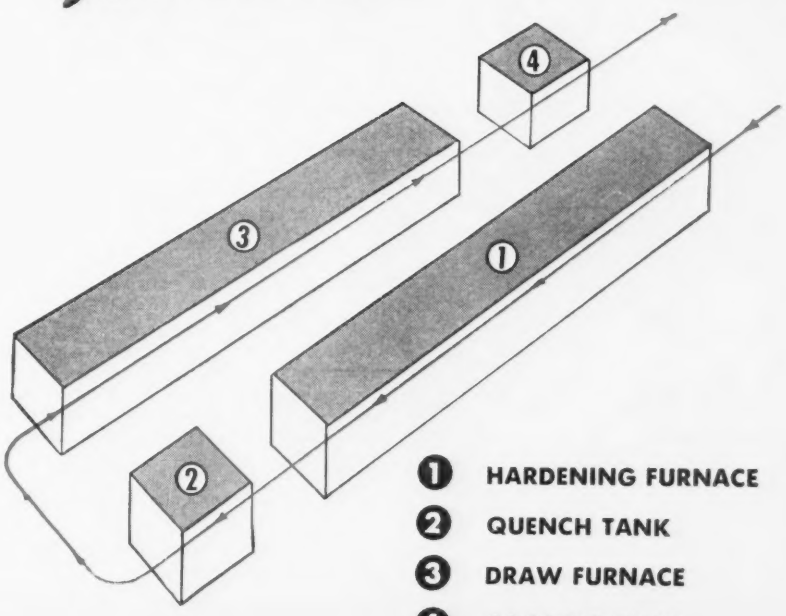

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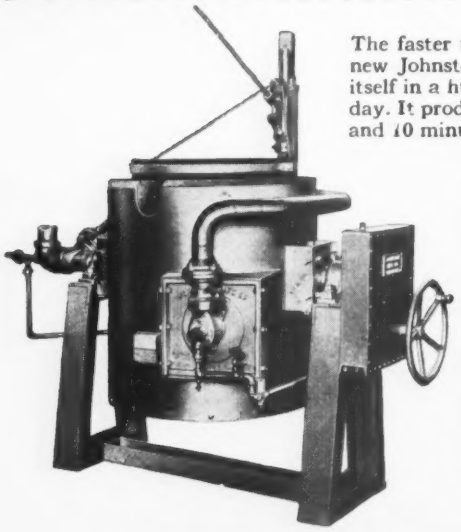

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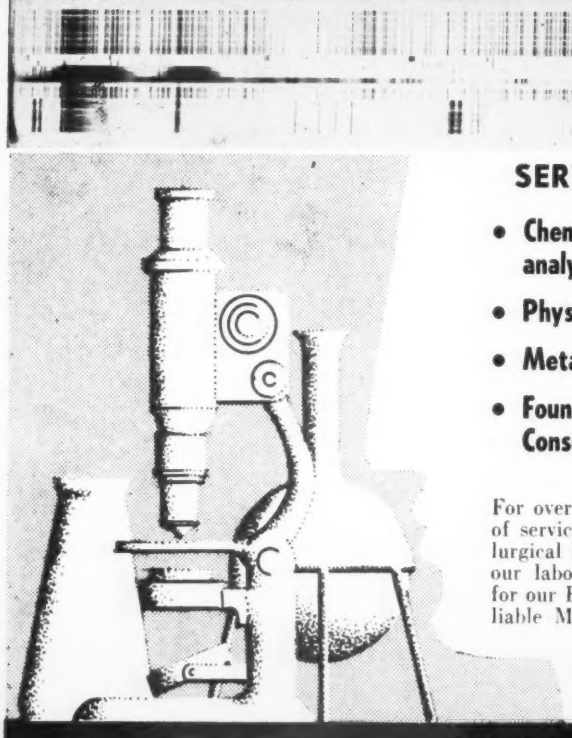

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activity and long life and, due to their size, must be made principally of hard wood, with those parts exposed to extreme wear cast of aluminum and attached to the pattern or corebox. Smaller coreboxes, as well as all loose pieces, are aluminum. Strike-off faces of the larger coreboxes are faced with aluminum or steel.

Construction of the medium-size pattern for high activity and long life requires an extensive knowledge of patternmaking not usually encountered in the majority of pattern shops. A listing of some of the major factors involved presents an awesome picture of the planning and building operations of this type of pattern. Allowances must be made for core clearances, core sagging and over-all shrinkage; cores must be substituted in place of loose pieces and deep pockets; suitable partings have to be established for molding purposes; coreboxes must be so arranged to facilitate ramming and drying; patterns are to be placed in flasks with proper gating and heading; and each facet must be investigated with an eye towards making design changes which will result in a lower cost casting.

Know Machine Shop Practice

The extreme mechanization of large-scale foundry operations demands that the maker of the high activity and long life pattern be as well acquainted with machine shop and assembling practices as the people who have charge of this phase of the construction.

Of course, each factor does not exist as a separate entity. Instead, each is dependent upon one, two or several other factors. The patternmaker needs the over-all picture and, because of a certain inconsistency in many variables, it has been difficult to reduce this type of patternmaking to an exact science. This overall picture is hard come by and usually arrived at only by active participation.

Making of the master patterns from which metal pattern equipment is made is an important phase of wood patternmaking. The master patterns for matchplate work must be the ultimate in accuracy since the matchplate will be a multiple impression of this one pattern. Therefore, if the master isn't accurate and the matchplate is made with as high as thirty impressions, every impression must be corrected or the master pattern adjusted and the matchplate made over. Either decision results in a more costly pattern and a longer delivery date for its completion.

The master patterns for larger cope and drag mounted equipment must be constructed so that the metal equipment can be made in the most economical manner without sacrificing accuracy. Finish allowance for the metal patternmaker must be allowed wherever possible to insure this accuracy. The wood patternmaker making the masters must therefore have a working knowledge of the machines used in the finishing of patterns. Also heavy cross sections that would appear on the pattern due to core prints or parting arrangements must be reduced. Sometimes the coring of heavy sections requires a great deal of skill and ingenuity.

The construction of master coreboxes for metal equipment requires a knowledge of core blowing equipment and techniques, since provision for these types of coremaking must be built into the box. The arrangement of blow holes in the box, the limitations as to the size of box that can be blown on the various machines, the location of air vent and screens and the clamping arrangements on the machines must be taken care of in the construction of the master corebox.

Undoubtedly, there are more variables that must be considered in the making of patterns for a mechanized foundry. These are the more important ones in our operations. Since there are so many variables to be considered and every new machine introduced into the foundry produces a new factor, the patternmaking department must be ready to cope with each problem as it arises. Specially trained personnel to suit changing conditions will enable a shop to do this expeditiously.

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ASTM Yearbook Out

American Society for Testing Materials has published its *ASTM Year Book* for 1953. Comprising 640 pages, it contains lists of its members alphabetically and geographically, a compilation of all the various technical committees and their membership, and general information on the charter, by-laws and regulations.

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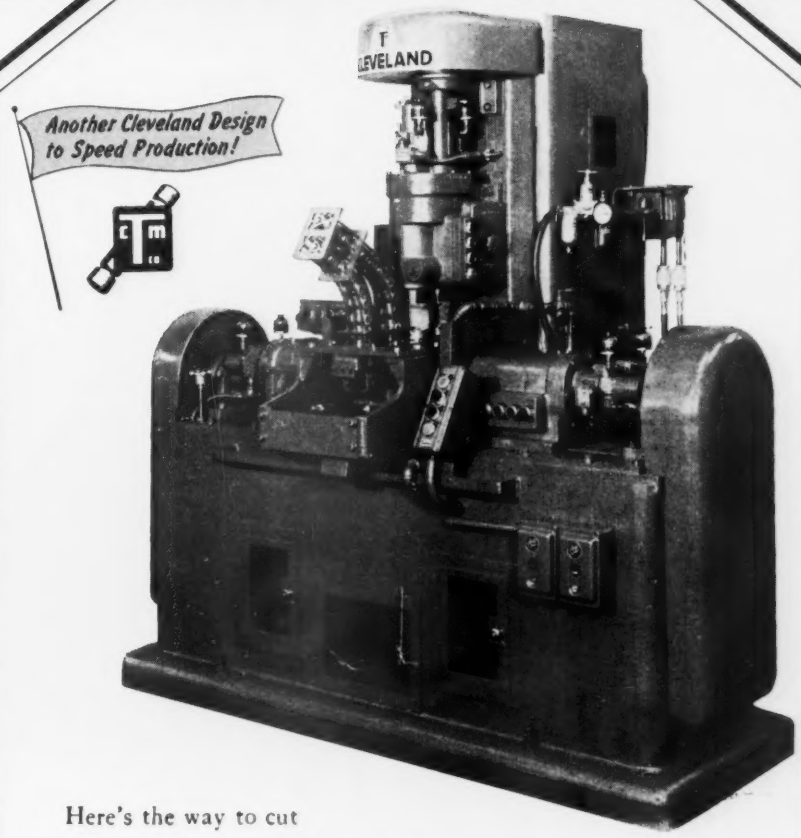

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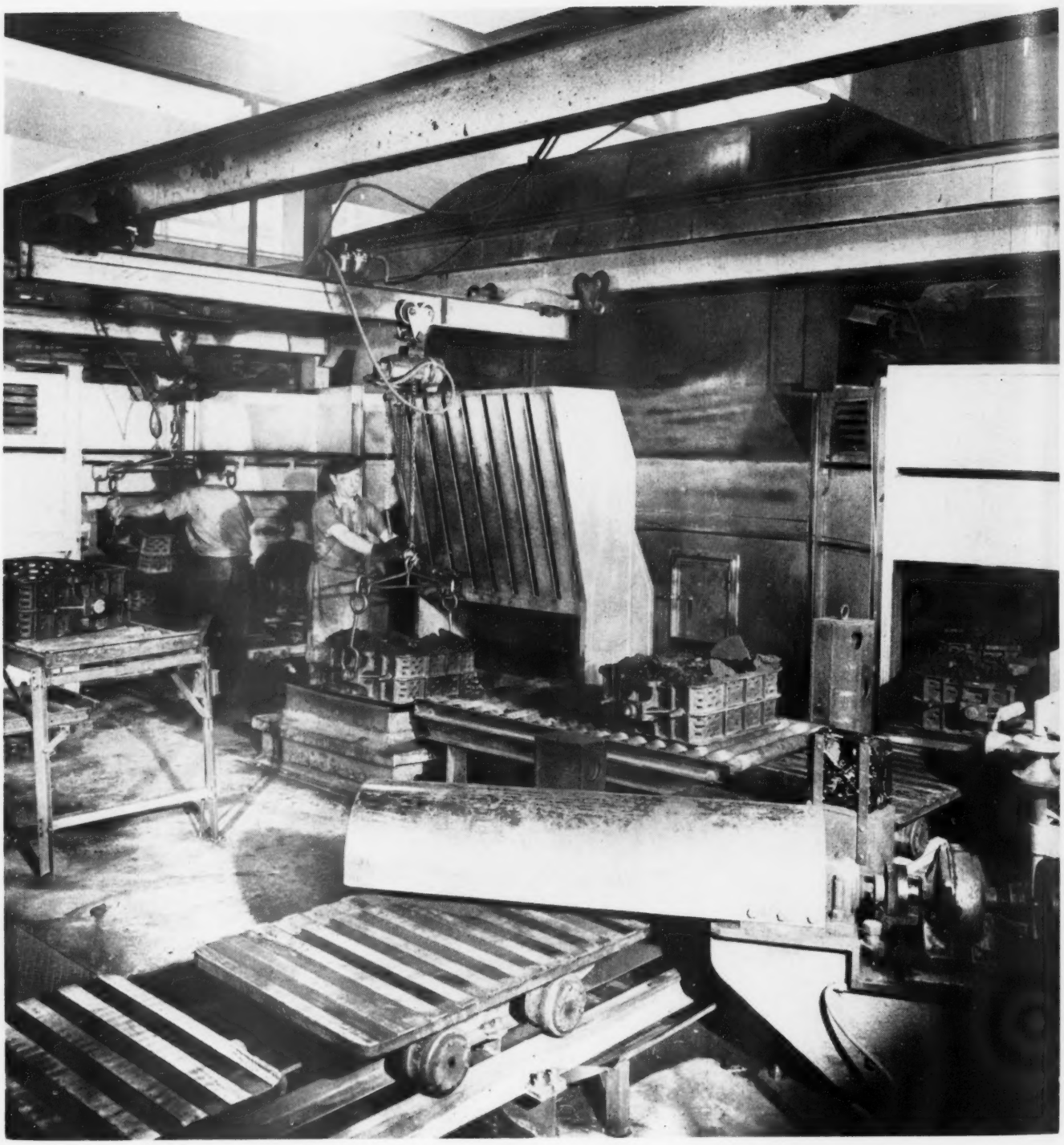

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Follow Boards and Matchplates (IV)

ABC of Foundry Practice

By PAT DWYER, *Engineering Editor*

MANY short-order jobs do not warrant the expense of making pattern plates or the more or less permanent matches or follow boards of plaster or proprietary compounds. On the other hand, expense of hard sand matches is negligible.

Nearly every foundry where hard sand matches are made has a pet formula for the mixture. Some favor all new molding sand. Others add varying amounts of sharp sand, ranging from 10 to 50 per cent. Others again make the matches from refuse under the tumbling barrels, or from spent sandblast sand. Matches that are dried in the oven are made from regular core sand mixtures in which the sand is bonded with any of the usual core binders. Naturally in this type the frame is metal instead of wood.

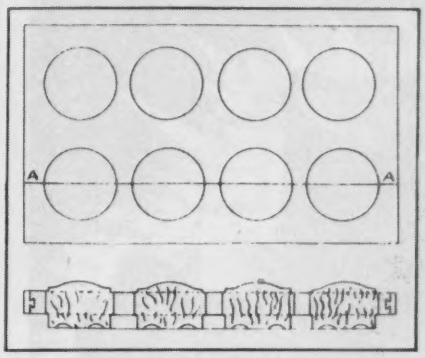
Step by Step Procedure

A typical match for snap flask work is made in the following manner: The estimated amount of new molding sand is dried and spread on the bench or on a smooth flat board and mixed with oil and litharge in the proportion of ⅛-part litharge, ½-part oil to 25 parts sand. Under ordinary shop conditions this means a heaping shovelful of sand, a cupful of oil and about as much litharge as will cover half the length of a trowel. The mixture is worked up with the hands, and enough water is added to bring the mass to the condition of good molding sand.

Either one of two methods may be practiced for ramming this material against the pattern. In the majority of instances the frame or false cope with a board attached to the back is rammed full of sand, struck off, and the pattern is rapped down the required distance. A hollow space roughly approximating the contour of the pattern first is scraped in the sand before the pattern is rapped down. Sand then is packed closely around the pattern and is cut away or built up as may be required to follow the parting line on the pattern. High points are reinforced with nails driven into the sand.

Considerable knowledge and skill are required on the part of the molder to follow this line accurately, avoid abrupt corners and see that all sloping surfaces are uniform. The entire body of oil sand is packed much harder than would be necessary in a mold. The pattern is removed and the match is placed in a warm place and allowed to dry and harden for about 24 hours. The face then is given a coat of shellac (this is optional), after which it is ready to go into service.

In certain instances, particularly where the irregular parting line extends below the joint line of the flask, a second method is practiced. The pattern is rammed in a drag with



Above—Plate as it appeared with holes outlined. Below—Section of plate at *AA* with patterns placed

suitable blocks between the drag and the rollover board, to bring the pattern the required distance above the joint line of the flask when the drag is rolled over. Sand in the drag is rammed harder than usual. After the drag is rolled over, the parting is made with the greatest care and accuracy. The match frame then is set in place, filled with the special mixture and rammed hard. The surface is scraped off flush and the permanent bottom board is nailed or screwed in place.

In some instances the frame may be lifted off after the manner of any cope, and then used again as many times as may be necessary. In other cases it may be advisable to roll drag and frame over as a unit and then remove the drag. Since this drag has served its purpose and is of no further use it may be shaken out. The joint face of the frame is touched up here and there if necessary. The pattern is removed and the match is dried as in the first instance. Some foundrymen favor clay instead of sand as matchboard material, particularly for gates of small patterns.

Registering Pattern Halves—Adjusting the two halves of a split pattern on a wood matchplate or mold board requires patience and the most extreme care. The sections must register exactly opposite each other, otherwise the resulting castings will be defective on account of an uneven joint along the parting line. Some patterns are more difficult than others to mount properly. The plan adopted by A. Landerer and shown in the accompanying illustration was described in a past issue of FOUNDRY. He claimed it was much simpler than others he had seen. With minor variations it may be adapted to any pattern symmetrical in cross section.

Prepare Pattern Stock

Before starting to make the plate, enough stock to make the eight patterns was glued and set away to dry. The plate was cherry ⅞-in. thick, jointed and glued strongly and accurately and reinforced with a strip dove-tailed all the way across each end to prevent it from warping. Outside dimensions of the plate corresponded to the size of the flask, 14 x 20 in.

A full-size drawing of the body block was scribed on a small layout board. With that as a guide two templates were made, one for the top and one for the bottom. Referring to the section illustration it will be noted that the pattern blocks are larger where they are incorporated with the plate. The shoulder or check thus provided at top and bottom locates each pattern in its proper relative position up and down in the plate. The check line top and bottom coincides with the top and bottom surfaces of the plate.

The eight patterns were turned out of end wood to prevent distortion of the patterns while in use. The patterns were turned first. Templates served to secure the proper contour top and bottom. Distance between the shoulders conformed accurately to the thickness of the plate. The patterns then were set to one side until the holes in the plate were prepared to receive them.

Any one of several methods might have been adopted for cutting the

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holes through the plate. Prevailing conditions and lack of certain equipment led to the decision to turn the holes on the lathe. A 36-in. face plate was selected for the purpose. After laying out the eight holes on the pattern plate, a small hole was drilled through the center of each. Taking each hole in turn it was centered on the lathe face plate. A 3-in. nail was employed to feel for the center of the plate. When located, No. 12 screws were inserted in the remaining holes and driven into the face plate of the lathe. Blocks screwed on the outside of the pattern plate served to hold it in place while turning the last two holes. Pieces of scrap lumber attached to the face plate and shifted each time a new hole was centered served to keep the face plate balanced and running true.

To provide for any small variation in the diameter of the holes, a different pattern was tried in each one and fitted. Corresponding marks were placed on each pattern and hole. After all were fitted they were glued and bradded in place permanently.

Presents Different Opinion

Commenting on the foregoing in a later issue of FOUNDRY, P. H. Root wrote as follows: "The method for registering patterns on a wooden matchplate as described by A. Landerer, while undoubtedly accurate, in my opinion is entirely too elaborate and entails altogether too much time and trouble.

"Had I been making the valve patterns described, I should have turned up the drag patterns with a ⅝-in.-diam stem, long enough to extend through the matchplate and cope pattern. I should then turn up the cope patterns and bore a ⅝-in.-diam hole through the center of each one. When the patterns are assembled on the plate, the long stem will bring each cope and drag half accurately in line. The holes in the matchplate may be loose. They do not affect the fit of the half patterns.

"White metal would make more durable cope patterns. The holes in the center could be drilled accurately after the castings were finished. We recently completed some white metal patterns 6 in. diam with an irregular parting line extending in places through the cherry matchplate. The matchplate was 13/16-in. thick. Each half pattern was white metal. The cope half was plain but the drag was provided with a ⅝-in. stem about 2 in. long in the center. Both half patterns were turned true in the lathe. Then the stem on the drag half was turned down to ½ in. diam. A corresponding ½ in. hole was drilled in the cope.

"A rough hole considerably larger than the stem was bored through the matchplate to allow for proper adjustment of the drag half pattern. The drag patterns were fastened with flathead brass screws and in many cases a cherry wood gate was sawed out and attached to the plate.

"With round patterns it is necessary only to slip the cope patterns over the stems and fasten them down with screws. With square patterns, or those of other shapes, of course it is necessary to insert a dowel pin in one corner. In making cherry matchplates it is advisable to attach a cast iron ⅜-in.-thick strip to each end. It is fastened with from seven to nine flat-head, ¾-in. or No. 10 wood screws. In addition to preventing the board from warping, these strips furnish an iron surface for attaching the guides.

"Two small lugs about 5 in. apart are cast on the drag side of each strip. They are drilled with a 13/64 in. drill to receive loop handles made from 3/16-in. rod. We have used these handles for many years. Considering their advantages I am surprised they are not used more extensively. The handles remain folded flat against the under side of the plate until the flask has been rolled over. Then they are pulled upright and used for drawing the pattern. The iron strip is extended to provide an attachment for a vibrator at a 45 degree angle.

"We use our own design of guides and guide pins with the opening of the *V* turned toward the flask. If there is any "give" in the cope, the guides will become tighter as the ramming progresses. Guides attached to the patterns are 1¾ in. long and extend 1 in. below the parting line. This feature is of considerable assistance in drawing the pattern.

"Cherry matchplates are serviceable and easy to make. We use them with white metal patterns for all new work going into snap flasks. Patterns for the cast iron strips should be planed and mounted on the matchplate. Length depends on flasks in use. A convenient length is 14 in. They are easily cut to fit narrower flasks."

Awards Service Pins

Mexico Refractories Co., Mexico, Mo., shut down its entire plant on the afternoon of Sept. 10 to award service pins to all employees with 5, 10, 15 or 20 years of service. The company began operations in 1929, and today it has more than 650 employees whose payroll totals over $3 million per year.

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Aluminum Foundry

(*Continued from page 119*)

or 30 lb, and from compact chunky form to thin sections of considerable area. In the latter classification are grilles 12 x 16 in. and ⅛-in. thick made by the full-permanent mold process. Another is a two-chamber surge tank or box for a gasoline pump about 10 x 10 x 2 in. made with a sand core.

Immediately in the foreground in Figs. 4, 5 and 7 is a permanent mold machine for producing a 6-in. tee connection for a well known aircraft producer. The casting is about 2 ft long and 12 in. high with ¼-in. section. Casting must be gas tight, and is produced by use of a sand core. Fig. 4 illustrates the pouring operation. Fig. 5 shows the operator waiting until the casting solidifies—that being predetermined, and controlled by an electric timer which flashes a lamp at the end of the proper time. Fig. 7 depicts the mold opened and ready for removal of the casting. Large sand core used in the mold is shown on the bench in front of the machine.

At present the shell molding department occupies an area of about 20 x 20 ft in the northwest corner of the foundry. Two views of the department are illustrated in Figs. 8 and 9. Equipment employed is simple and much of it was constructed during the experimental operations. Sand used is clay-free silica of 120 and 80 AFS grain size which may be employed alone or in combination, depending upon desired surface finish on the casting size or section thickness of the casting, and dimensional tolerances expected.

Sand is mixed with about 7 per cent resin, both in the dry state, in a small paddle type unit. After mixing the sand is placed in either of the two dump boxes shown at the right in Fig. 8. Exhaust hoods are located over both boxes and the disassembly or separation bench between the two boxes.

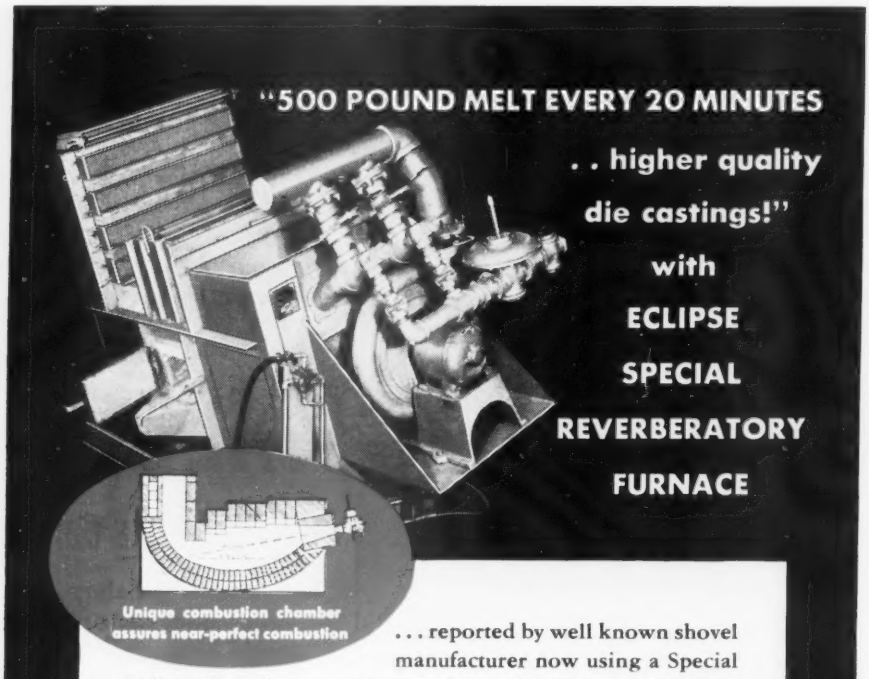
In operation the pattern is placed in the electrically heated oven at the left in Fig. 8 which was designed and constructed by the firm. It contains two drawers on both sides so that the two operators can work without interference and use two pattern plates if desired. When the pattern has reached a temperature of about 400° F it is taken from the oven and clamped on top of the dump box, and the box rolled over with an easy motion. Quick rollover tends to cause a separation of resin and sand so that some areas may be covered with sand containing insufficient resin for proper bonding.

Sand Rests on Pattern

With the box in the inverted position the sand mix is allowed to rest on the pattern for 5 to 20 seconds depending upon the desired thickness of shell, sand mix, and conformation of the pattern. Then the box is rolled back to its normal position, the pattern and adhering sand shell is unclamped, and placed in the electric oven for curing or polymerization of the resin. Curing is accomplished at about 650° F, and the time will vary from 1½ to 2½ minutes depending upon shell thickness and sand mix employed.

When the shells have been cured, pattern and shell are removed from the oven, placed on the disassembly bench, and the shell separated from the pattern. The shell is placed on a rack, and the pattern is ready for another cycle.

Finished shells are carefully examined and fastened together by any of the several different methods of bolting, clamping or pasting. Where highest accuracy on dimensional tolerances is desired, the shells are bolt-



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ed together. After assembly the shell molds are taken to the pouring area, which is located under an exhaust hood surrounded with a sliding curtain. This arrangement insures that any fumes developed during pouring are carried outside the building.

Castings from the sand molding department and permanent mold castings containing cores are first taken to the rough cleaning department located in the southwest corner of the building for removal of any adhering sand and cores. Then these castings, along with the full-permanent mold and shell molded castings, are taken to an adjoining room where gates and risers are removed by bandsaw or abrasive cut-off-wheel. Trimmed castings are placed in tote boxes and transported to the final finishing department (Fig. 9) located in the front of the building. Finishing operations include grinding, bandsawing and rotary filing. In this department the castings also receive final inspection and are prepared for shipment.

AFS Receives National Safety Council Award

Eleven trade associations, including the American Foundrymen's Society, have been presented with National Safety Council awards for their work in promoting safety in small business. The awards were presented by Ned H. Dearborn, president of the council, at a special luncheon meeting for association executives on Oct. 20, during the 41st National Safety Congress and Exposition in Chicago.

The award gives recognition to associations for the general excellence of their safety services and for contributions to the reduction of occupational injuries in their industries. In making the awards, the council's technical committee and committee of judges took into consideration accident prevention activities such as publicity, safety conferences, contests and publication of technical material.

Book Review

The Intelligent Use of the Microscope, by C. W. Oliver, cloth, 5½ x 8½ in., published by Chemical Publishing Co., New York. Price $4.

Intended for students and beginners, this volume aims for an understanding of the possibilities and limitations of the microscope, of the principles of its design and of the precise functions of its components and accessories. The author has attempted to avoid theory without relation to practice and rule-of-thumb instruction without explanations.

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Trade Publications

For more details on these items use reply card—page 257

STEEL SHOT: American Wheelabrator & Equipment Corp., 1102 South Byrkit St., Mishawaka, Ind.—Bulletin 89 discusses the firm's new steel shot, a blast cleaning and peening abrasive, and describes the automatic process and quality control exercised in its manufacture. Other sections examine factors important to economical, efficient consumption of the abrasive and methods of performing abrasive tests under actual operating conditions.
For More Details Circle No. 101—Page 257

RUBBER BEARINGS: Lucian Q. Moffitt Inc., 333 South Main St., Akron, O.—Catalog contains engineering data pertinent to rubber bearings manufactured by B. F. Goodrich Co. for such industrial equipment as pumps, agitators and similar equipment in which bearings can be lubricated with water or by the liquid handled in the equipment.
For More Details Circle No. 102—Page 257

CRUSHERS: Pennsylvania Crusher Co., Liberty Trust Bldg., Broad & Arch Sts., Philadelphia 7—Booklet gives information on how to make efficient and satisfactory application of various types of crushers to specific jobs. Such factors as power consumption, parts wear, maintenance costs, uniformity of product and others are discussed.
For More Details Circle No. 103—Page 257

ELECTRIC TOOLS: Thor Power Tool Co., Aurora, Ill.—Catalog 39-A presents complete illustrations, descriptions, specifications and prices of universal, electric industrial and automotive tools. Accessories and attachments available also are shown.
For More Details Circle No. 104—Page 257

PROPORTIONING SYSTEM: Richardson Scale Co., Van Houten Ave., Clifton, N. J.—Bulletin 0351 pictures and describes the company's recently developed proportioning and materials handling system for automatically making up formulated mixes of bulk products.
For More Details Circle No. 105—Page 257

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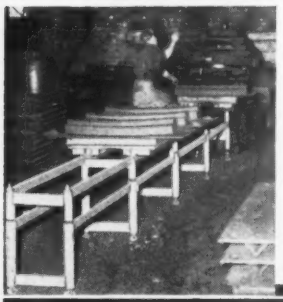

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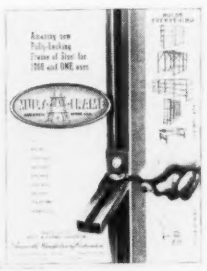
AIR COMPRESSORS: Joy Mfg. Co., Henry W. Oliver Bldg., Pittsburgh 22—Bulletin A-44 on oilfree air compressors contains a variety of illustrations and information including section drawings, dimensions, specifications and other material.
For More Details Circle No. 106—Page 257

CORE BINDER: Monsanto Chemical Co., Plastics Division, Springfield 2, Mass.—Product information bulletin 84 offers complete information about a urea formaldehyde resin core binder. Selections cover product advantages, production techniques, preparation of core mix, foundry formulations, pointers on "trouble shooting in the coreroom" and other material.
For More Details Circle No. 107—Page 257

GYPSUM CEMENTS: U. S. Gypsum Co., Dept. 139, 300 West Adams St., Chicago 6—Booklet serves as a toolmaker's guide and gives periodic reports on the latest gypsum tooling developments. Contents embrace material from the basic fundamentals of patternmaking to tooling engineering with gypsum cement.
For More Details Circle No. 108—Page 257

METAL COATINGS: Turco Products Inc., 6135 South Central Ave., Los Angeles 1—Pamphlet A-108 describes the company's line of six coating materials for organic finishing. It includes a phosphating reference chart which outlines the purpose of phosphate coatings and how they should be used.
For More Details Circle No. 109—Page 257

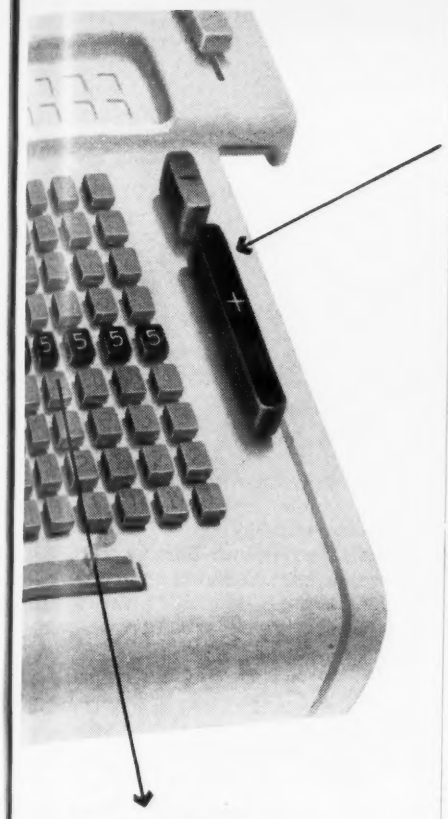
CHANNEL FRAME: Mult-A-Frame Division, Ainsworth Mfg. Corp., 1471 East Atwater, Detroit 7 — Catalog on channel frames and fittings contains installation photographs, illustrations, data on various types and sizes, engineering data charts and information on how and where to purchase the fully locking steel framing material.



For More Details Circle No. 110—Page 257

ROTARY FURNACES: Stamford Engineering Works, Stamford, Conn.—Illustrated booklet presents a variety of information concerning rotary furnaces manufactured by Monometer Mfg. Co. of England. Engineering data, diagrams, photographs and other material are included.
For More Details Circle No. 111—Page 257

PNEUMATIC CONTROL: Minneapolis-Honeywell Regulator Co., Industrial Division, Wayne & Windrim Aves., Philadelphia 44: Catalog 8950 contains descriptions, illustrations and specifications for accessories for pneumatic control applications, including air pressure regulators, air



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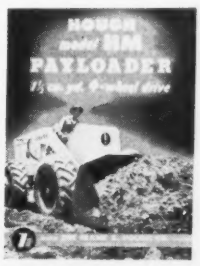
For More Details Circle No. 112—Page 257

TRACTOR-SHOVEL: Frank G. Hough Co., 703 Seventh St., Libertyville, Ill.—Catalog 255 contains action views of a 1-cu-yd tractor-shovel as it performs earth and material handling jobs for various kinds of operators. Important details are fully highlighted, and pictures and detailed specifications of all seven sizes of the machine are included.



For More Details Circle No. 113—Page 257

PRINTER: Industrial Photographic Sales Division, Eastman Kodak Co., Rochester 4, N. Y.—Leaflet pictures a new printer and gives full details of the unit, which is for use in conjunction with a typewriter and is said to produce up to three copies of any written, drawn or printed material up to 8½ x 11 in. in 1 minute.

For More Details Circle No. 114—Page 257

ARC WELDING MACHINES: Air Reduction Sales Co., 60 East 42nd St., New York 17—Catalog 1340 describes over 20 different models of arc welding machines. Alternating and direct current and inert gas models are illustrated with complete descriptions covering specifications, features and electrical data.

For More Details Circle No. 115—Page 257

AIR CONTROLS: Mechanical Air Controls Inc., 15311 West Eleven Mile Rd., Detroit 37—Catalog 53 gives complete data concerning the company's line of valves, including solenoid, foot, cam, pilot pressure and hand operated pilot and line mounted types. Photographs, diagrams and parts lists are included.

For More Details Circle No. 116—Page 257

FORK TRUCKS: Clark Equipment Co., Buchanan, Mich.—Current issue of the company's publication, *Material Handling News,* features an experimental fork truck and encloses a questionnaire to get reaction of truck users. Bulk of the publication is devoted to the firm's entire line of fork trucks.

For More Details Circle No. 117—Page 257

VACUUM MACHINES: Hild Floor Machine Co., 740 West Washington Blvd., Chicago 6—Folder on wet-or-dry vacuum machines uses illustrations to explain principles of operation and to show various applications. Specifications are listed, too.

For More Details Circle No. 118—Page 257

INDICATORS: Leeds & Northrup Co., 4934 Stenton Ave., Philadelphia 44—Catalog ND42 contains information about the use of manually operated portable and panel indicators

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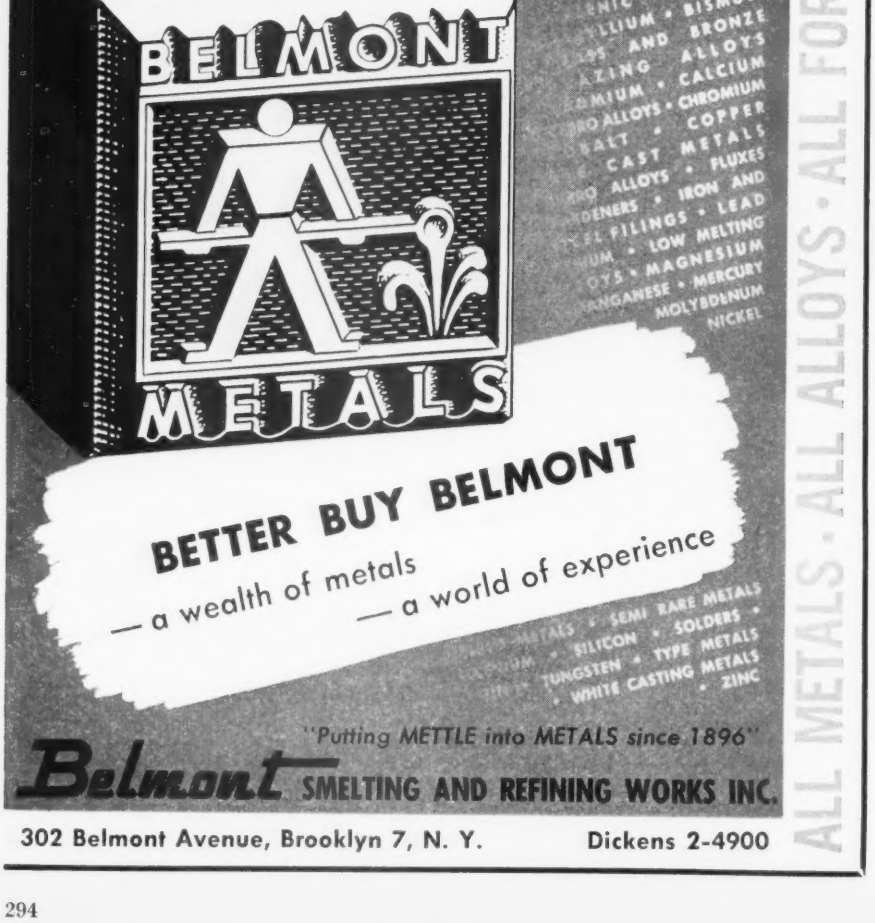
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to measure temperature, electrolytic conductivity or pH precisely. Instruments are arranged according to application. Diagrams, specifications and installation photographs are included.

For More Details Circle No. 119—Page 257

HYDRAULIC HOSE SELECTOR: Sales Development Manager, Republic Rubber Division, Lee Rubber & Tire Corp., Youngstown 1, O. — A selector is offered to users of rubber covered hydraulic control hose. Starting with any known factor, such as inside or outside diameter, minimum burst, etc., a designer or maintenance man can use the selector to determine the proper hose he requires for a given operation.

For More Details Circle No. 120—Page 257

DISPERSIONS: Acheson Colloids Co., Port Huron, Mich.—Folder contains a list of various colloidal graphite, molybdenum disulfide, vermiculite and zinc oxide dispersions and includes information as to carrier, solids content, particle size, consistency, density, diluent, need for agitation and applications of each.

For More Details Circle No. 121—Page 257

BELT SPLICER: Aget - Detroit Co., Ann Arbor, Mich.—Bulletin 310 discusses the operation of an abrasive belt splicer and the economies it is said to make possible. The bulletin illustrates a simplified method for making up joined belts, ready to use, from paper or cloth backed abrasive in roll form.

For More Details Circle No. 122—Page 257

METAL ABRASIVSE: Harrison Abrasive Division, Metals Disintegrating Co., Elizabeth B, N. J. — Technical bulletin No. 6 explains how to run a production test of metal abrasives to determine which one yields desired results at the least over-all costs.

For More Details Circle No. 123—Page 257

INDUSTRIAL VENTILATION: Aerovent Fan Co., 720 East Ash St., Piqua, O.—Catalog 20, an illustrated guide to industrial ventilation and air movement, concerns engineering, installation and operating data for all standard and special duty fan applications.

For More Details Circle No. 124—Page 257

NICKEL ALLOYS: International Nickel Co., 67 Wall St., New York 5 —Booklet offers illustrations and data on the use of nickel alloys to meet the requirements of improved design and modern methods of manufacture in railroad equipment.

For More Details Circle No. 125—Page 257

MAINTENANCE OF CONTROL: Allis-Chalmers Mfg. Co., 1032 South 70th St., Milwaukee—Manual en-

titled "Proper Maintenance of Control" tells what to look for in maintaining control equipment. It makes suggestions about common problems, gives a chart showing symptoms, possible causes and cures and lists 26 points for checking.
For More Details Circle No. 126—Page 257

VACUUM FURNACES: F. J. Stokes Machine Co., 5500 Tabor Rd., Philadelphia 20—Catalog 770, entitled "Vacuum Furnaces and Their Application to the High Vacuum Processing of Metals," discusses in some detail a number of processes which are being carried out in the three types of vacuum furnaces now being built.
For More Details Circle No. 127—Page 257

WELDING DEVELOPMENTS: Eutectic Welding Alloys Corp., 40-40 172nd St., Flushing, New York—Folder TIS 1621 contains short, factual descriptions of 18 welding alloy and organic bonding developments which have emanated from the firm's research department since the first of the year.
For More Details Circle No. 128—Page 257

TUBULAR CONVEYORS: Hapman Conveyors Inc., Kalamazoo, Mich.—Bulletin HEM 145 shows engineering and mechanical details of tubular conveyors for the movement of wet and dry flowable material. Nine tubular conveyor layouts are illustrated.
For More Details Circle No. 129—Page 257

FIRE PUMPS: Ingersoll - Rand Co., 11 Broadway, New York 4—Bulletin on horizontal, single-stage and vertical, multistage fire pumps provides cross-sectional views and additional descriptions of their design, construction and performance.
For More Details Circle No. 130—Page 257

TECHNICAL RESEARCH: Public Relations Dept., Foster D. Snell Inc., 29 West Fifteenth St., New York 11—Booklet designed to explain the applied research, development and testing services offered by the firm starts on the tenth floor of the New York laboratories and descends to the first with a floor-by-floor description. It is profusely illustrated with shots of test equipment and work in progress.

For More Details Circle No. 131—Page 257

GRINDING WHEEL: Merit Products Inc., 4023 Irving Place, Culver City, Calif.—Circular describes a flexible grinding wheel, which is said to operate on an entirely new principle, for light grinding and metal finishing.
For More Details Circle No. 132—Page 257

SPACE HEATERS: American Air Filter Co., 1824 Third Ave., Moline, Ill.—Booklet entitled "Guide to the Selection and Use of Portable Space

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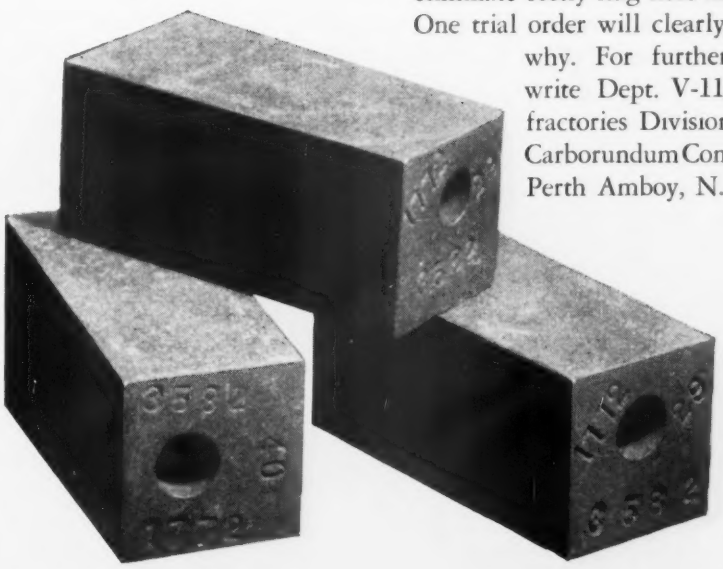

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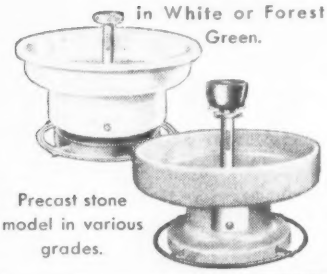

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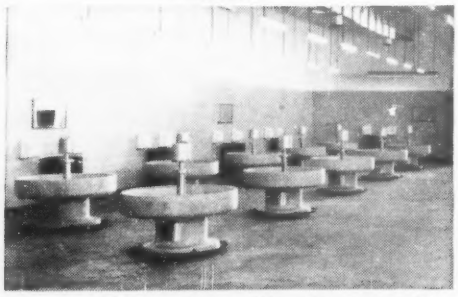

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For More Details Circle No. 133—Page 257

CABLE CONVEYORS: Cable-Link Corp., 20175 John R St., Detroit 3—Brochure describes the operation of cable conveyor systems, outlines their advantages and provides data as to capacities and other pertinent subjects.
For More Details Circle No. 134—Page 257

FORK TRUCK: Baker-Lull Corp., Dept. KP, 314 West 90th St., Minneapolis—Two-color literature on a new fork loading truck describes applications and features of the 4-wheel drive equipment and lists complete specifications for all models.
For More Details Circle No. 135—Page 257

DUST ELIMINATORS: Schmieg Industries Inc., P. O. Box 4701, Detroit 34— Bulletin VU-8-53 pertains to two new vertical rotor wet type dust and fume eliminators, one of which is for wet collection and elimination only, whereas the other is a combination primary dry and secondary wet collection and elimination unit.

For More Details Circle No. 136—Page 257

SHOVELS AND CRANES: Thew Shovel Co., Lorain, O.—Form 55570-3 covers design and construction features and applications of power cranes and of shovels in the 1¾-yd class. Illustrations are included.
For More Details Circle No. 137—Page 257

SILICONE PRODUCTS: Garlock Packing Co., Palmyra, N. Y.—Booklet describes silicone rubber products including diaphragms, gasketing, sheet packing, oil seals, rings, insulation tape, rod and valve stem packings and molded shapes.
For More Details Circle No. 138—Page 257

AIR HOISTS: Aro Equipment Corp., Bryan, O.—Form 5313-T presents operating features and advantages of a 1000-lb air hoist. Specifications and illustrations help to tell the story.
For More Details Circle No. 139—Page 257

SAND MOISTURE: Haylco Controls Corp., Neenah, Wis.—Folder explains operation of a unit for automatically determining and controlling the moisture content of sand at the mixer.
For More Details Circle No. 140—Page 257

MATERIALS HANDLING: Heppenstall Co., 4620 Hatfield St., Pittsburgh 1—Illustrated brochure describes "C" hooks and various types of automatic and motorized tongs for materials handling.
For More Details Circle No. 141—Page 257

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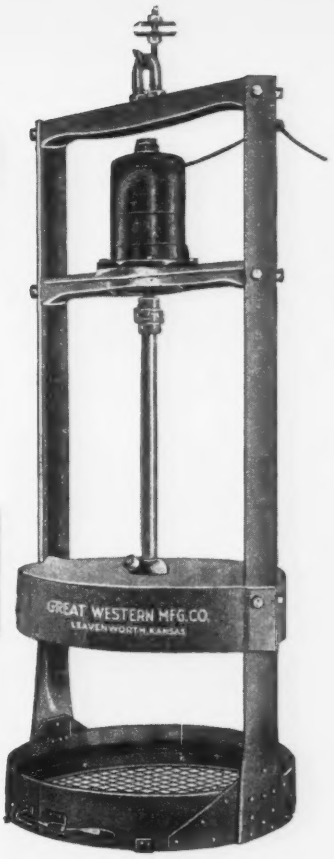

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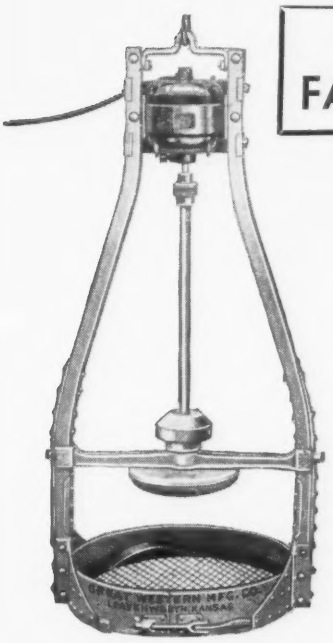

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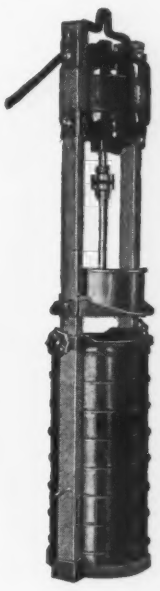

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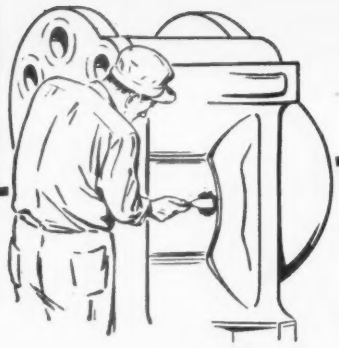

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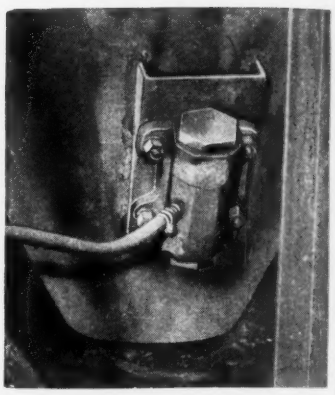

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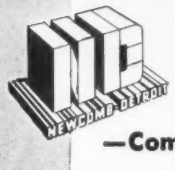

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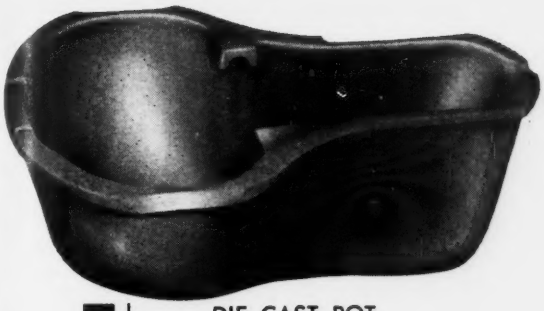

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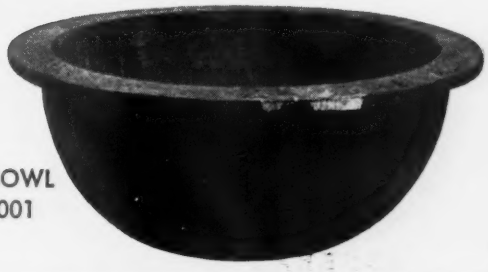

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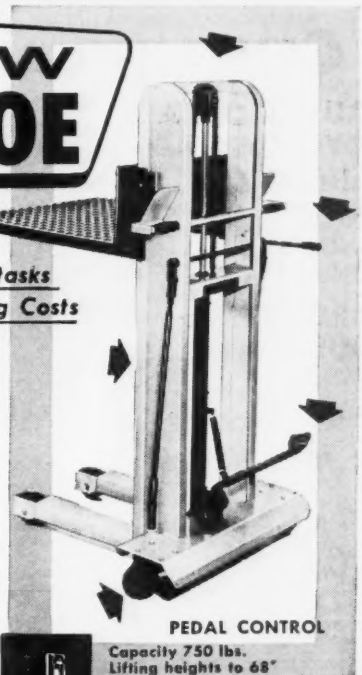

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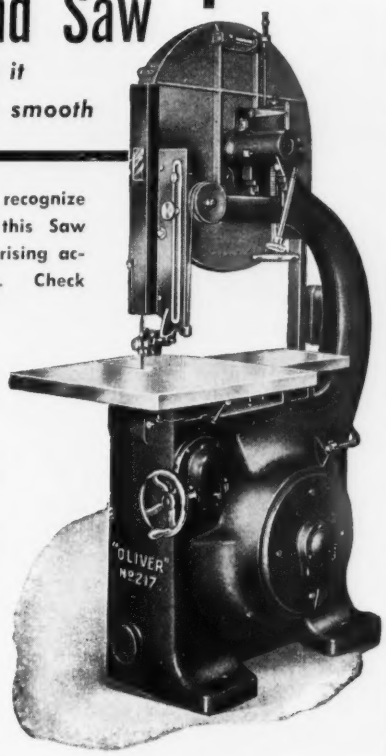

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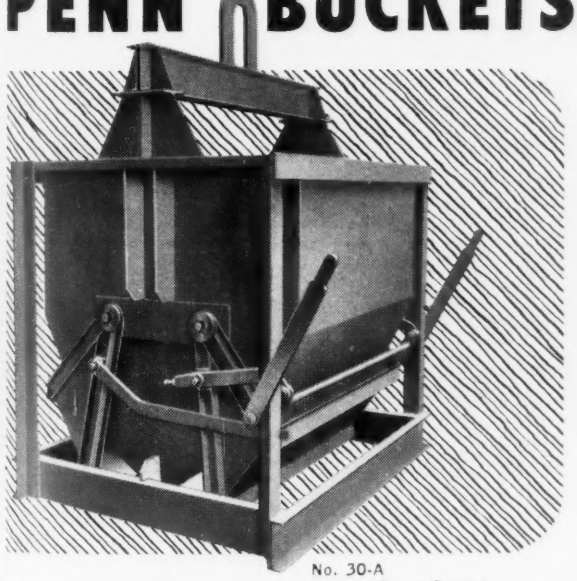

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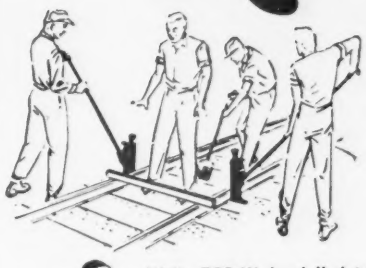

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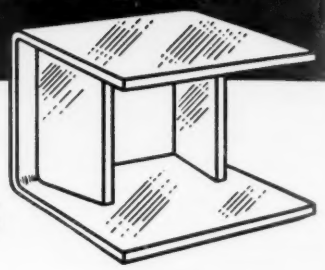

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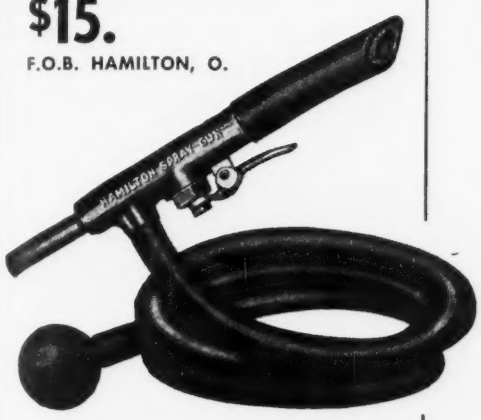

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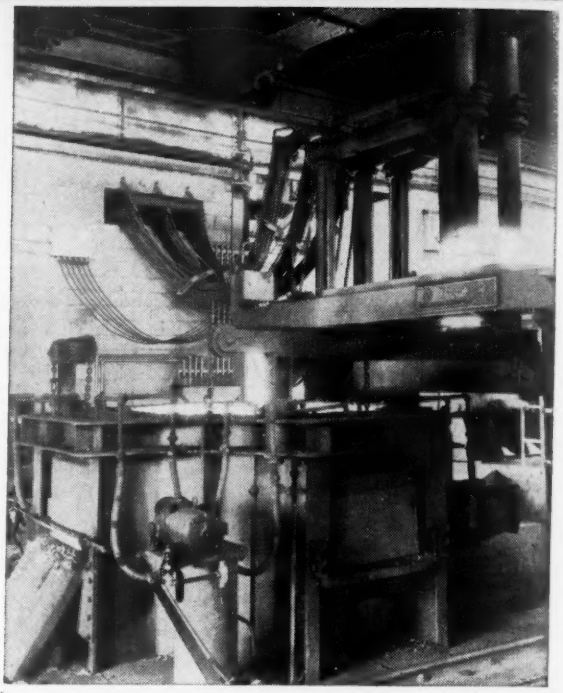

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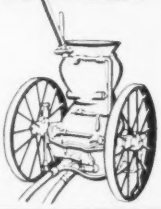

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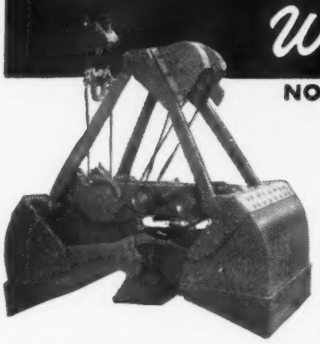

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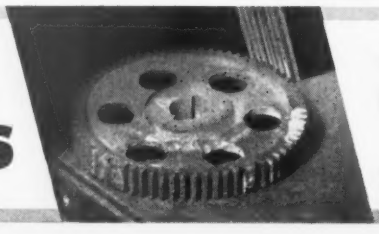

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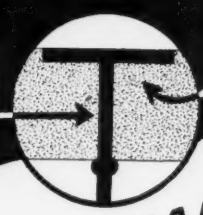

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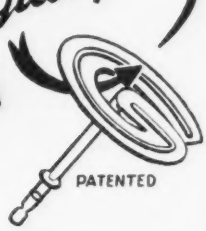

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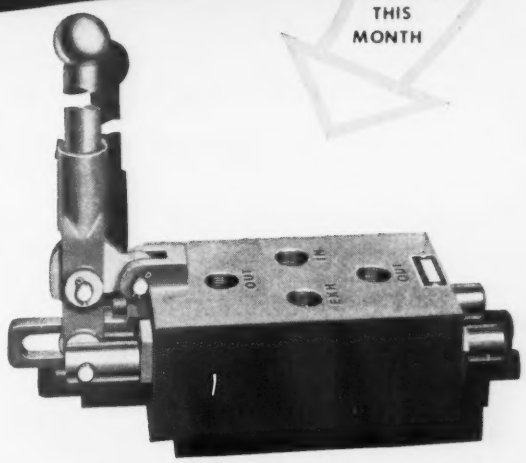

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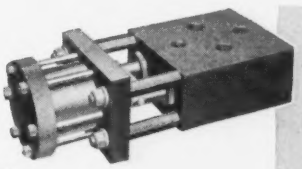

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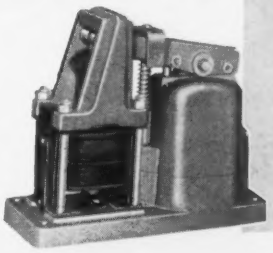

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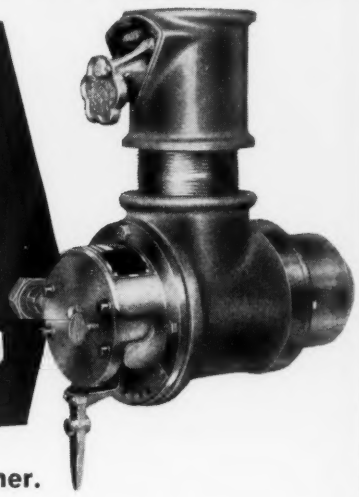

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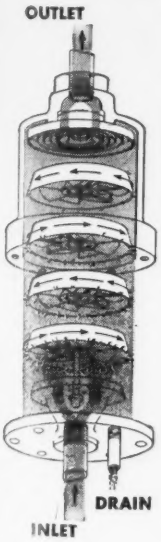

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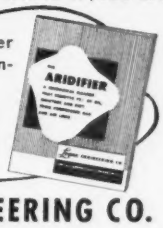

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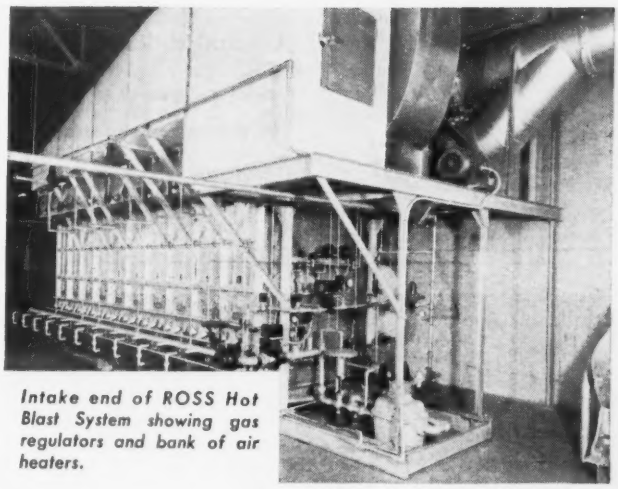

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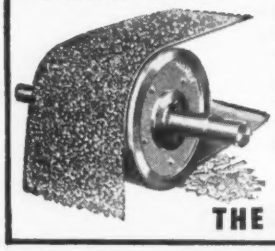

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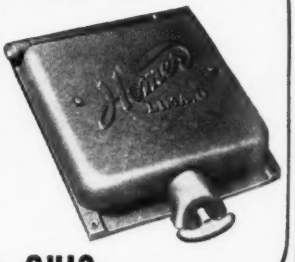

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Desire services of experienced gray iron engineer; mechanized; light to medium castings. Prefer college graduate. Reference required. State qualifications and salary expected. Well established foundry located on West Coast. Address: Box 815, FOUNDRY, Cleveland 13, Ohio.

GENERAL FOUNDRY FOREMAN

Wanted for gray iron foundry in New York State. Not mechanized. Experience in floor and machine molding and all phases of foundry operations. Advise age, experience and starting salary. Address: Box 799, FOUNDRY, Cleveland 13, Ohio.

Help Wanted

TEACHER OF FOUNDRY PRACTICE

For Baltimore's newest vocational-technical high school in modern fully equipped new shop.
This position will attract the person who is really interested in teaching in ideal surroundings and who also recognizes that the salary will be less than the industry will offer.
State age, education, and experience.

DEPARTMENT OF EDUCATION
DIVISION OF VOCATIONAL EDUCATION
3 EAST 25th STREET
BALTIMORE 18, MD.

FOUNDRY FOREMAN

To take charge of molding machine production in progressive New England foundry. Require steel or alloy steel foundry experience in semi-production or jobbing shop. Excellent opportunity for right man. Write full details of experience and personal background and salary expected. All replies confidential.

BOX 822
FOUNDRY CLEVELAND 13, OHIO

CORE ROOM FOREMAN

For progressive New England foundry. Require man with actual foreman or assistant foreman experience in either jobbing or production shop. Should know core blower operation. Company long established offers good opportunity. In reply give complete resume of experience and background with salary expected. All replies confidential.

BOX 847
FOUNDRY CLEVELAND 13, OHIO

ELECTRIC FURNACE ASSISTANT MELTER
ALSO
ASSISTANT CLEANING ROOM FOREMAN

These jobs offer opportunity for experienced men to advance to top supervisory positions in Cleveland steel foundry.

BOX 845
FOUNDRY CLEVELAND 13, OHIO

GENERAL FOREMAN

For cleaning room of a large steel foundry located in Western Pennsylvania. Must be experienced in the cleaning of miscellaneous and railroad castings for a production shop. Must be a good supervisor and be able to get production from the workers. Write giving places of previous employment, age and salary desired. Address: Box 798, FOUNDRY, Cleveland 13, Ohio.

PATTERNMAKER

Specialty shop in university town central Illinois has opening for patternmaker aged 25-45 capable of training apprentices and building up shop in working with research department in methods of more economically making better patterns. Address: Box 817, FOUNDRY, Cleveland 13, Ohio.

CHIEF METALLURGIST

Steel foundry. Knowledge of sand control essential. Submit complete work history record and salary desired. Address: Box 834, FOUNDRY, Cleveland 13, Ohio.

PATTERN SHOP FOREMAN

Must have thorough knowledge of patterns used in production of railroad castings. Send resume of education and experience. Address: Box 833, FOUNDRY, Cleveland 13, Ohio.

CHIEF INSPECTOR

Experienced in lay-out and inspection of miscellaneous steel castings of medium and large size. Write experience work history and salary desired. Address: Box 832, FOUNDRY, Cleveland 13, Ohio.

Positions Wanted

INDUSTRIAL ENGINEER

Years of experience, well qualified to head your department in reducing cost and increasing production. Also assist management. Address: Box 841, FOUNDRY, Cleveland 13, Ohio.

Positions Wanted

EXECUTIVE SEEKS CHANGE

Vice President in charge of multiplant operation doing over a million dollars per month seeks change. Successful diversified record in production, development, cost reduction, organization. Require top management post with challenge of heavy responsibility. Will relocate. Prefer the South.

BOX 843
FOUNDRY CLEVELAND 13, OHIO

MANAGER—SUPERINTENDENT

Engineering graduate. Practical experience in all foundry departments. Thoroughly experienced in operating mechanized and floor foundry. Fifteen years present position, 47 years of age. Desire to locate away from large metropolitan area. Address: Box 846, FOUNDRY, Cleveland 13, Ohio.

MOLDER

Thirty-five years' foundry experience as a molder in iron and brass works. Mostly heavy class work. Green and dry sand work. Familiar with nonferrous metal. Available for suitable position any time, any place. Address: Box 830, FOUNDRY, Cleveland 13, Ohio.

FOUNDRYMAN

Engineer graduate. Fifteen years' experience in high production gray and malleable foundries. Thirty-three years old. Well versed in all foundry problems, namely scrap analysis, pattern design, gating and molding and core problems. Will consider any job capable of doing, foreign or domestic. Address: Box 840, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY MANAGER OR SUPERINTENDENT

Desire position with a progressive foundry. Experience in all phases of foundry management and operations. Address: Box 848, FOUNDRY, Cleveland 13, Ohio.

FOUNDRYMAN

Desire position with iron or steel foundry in melting, laboratory, heat treating, sand control or inspection. Experience covers melting with both cupola and electric furnace and all phases of laboratory control. Capable of meeting customers and promoting good relationships. Age 38. Now employed as metallurgist with very high production gray iron foundry. Address: Box 836, FOUNDRY, Cleveland 13, Ohio.

MANAGER—SUPERINTENDENT

Desire to relocate with a Southern foundry, ferrous or nonferrous. Can direct all phases of foundry activity. Set-up, train, and supervise all departments. Processing complete from print to casting, sand (all types), permold and shell. Top references. Address: Box 779, FOUNDRY, Cleveland 13, Ohio.

FOUNDRYMAN

Superintendent or general foreman. Practical man. Twenty-seven years' experience in gray iron and nonfrrous jobbing and high production shops. Now employed. Address: Box 768, FOUNDRY, Cleveland 13, Ohio.

METALLURGIST

College graduate. Shell molding development and production experience. Malleable melting and annealing experience. Chemical, sand, metallurgical laboratories. Interested in steel, malleable or gray iron. Address: Box 820, FOUNDRY, Cleveland 13, Ohio.

EXECUTIVE'S TECHNICAL ASSISTANT OR RESEARCH DIRECTOR

Degree in Met. Eng., qualified by practical experience and technical knowledge to assist in reducing cost and defective castings, and developing improved methods of manufacture based on applied research. Ferrous and nonferrous experience. Age 35. Address: Box 824, FOUNDRY, Cleveland 13, Ohio.

Positions Wanted

SHELL MOLDING ENGINEER

Graduate industrial engineer experienced in planning, installation and administration of high production gray iron, shell mold foundry. Presently employed. Address: Box 829, FOUNDRY, Cleveland 13, Ohio.

FOUNDRYMAN

Experienced and qualified. Have developed and produced a special manganese steel that outwears the regular by thirty-five per cent. Desire position with a manganese steel company interested in advantages of producing this special material. Used for ball and rod mill liners and other special mining equipment. Capable of high quality control of all other production. Address: Box 827, FOUNDRY, Cleveland 13, Ohio.

GENERAL MANAGER

Mature, profit-minded, dependable. Has successfully managed four companies—two taken out of the red. Available for service shortly with medium-size company requiring reliable directing ability in management, sales finance and production. Excellent experience, foundry machine and related lines. Address: Box 825, FOUNDRY, Cleveland 13, Ohio.

METALLURGIST

Age 37, college graduate. Fourteen years experience in gray iron with all types of cupolas. Can organize and supervise laboratory and melting departments. Experienced in all types of testing including gamma ray and ultrasonic. Address: Box 839, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY EXECUTIVE

Gray iron, 28 years' experience in production and jobbing, 10 years as a manager of plants with daily tonnages as high as 125 ton, employing up to 300. Man of unquestionable character and excellent ability. Know foundry thoroughly. Address: Box 814, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY EXECUTIVE

Well versed in all foundry procedures. Consulting on metallurgy, sand, quality control, melting procedures, production and general foundry problems. Desire position with gray iron foundry. References. Address: Box 816, FOUNDRY, Cleveland 13, Ohio.

FOUNDRYMAN

Experienced nonferrous metal foundryman, desire position as ingot metal salesman with reputable smelter, where knowledge of casting problems can be of value. Address: Box 826, FOUNDRY, Cleveland 13, Ohio.

GRADUATE INDUSTRIAL ENGINEER

Experienced. Wage incentives, time study, standard data, indirect standards, methods, plant layout, work simplification, in all phases of foundry practice, including: electric and open hearth steel, malleable and nonferrous metals. Heavy experience in R.R. steel, large, medium, and small. Excellent union management relations. Would like to relocate with progressive organization, S.W. or West Coast. Address: Box 837, FOUNDRY, Cleveland 13, Ohio.

CORE ROOM FOREMAN

Age 45. Experienced in all phases of core making. Rig boxes for all types of core blowers. Can handle large groups of workers. Good on production. Will relocate, but prefer West Coast or Texas. Address: Box 821, FOUNDRY, Cleveland 13, Ohio.

GENERAL FOREMAN OR SUPERINTENDENT

For cleaning division. Well qualified to run this department on all operations. Will reduce your cost. Address: Box 842, FOUNDRY, Cleveland 13, Ohio.

WEIGHT ESTIMATING

Estimating of casting weights furnished by return mail. Accurate, reliable and confidential service. Automatic calculator equipment. Nominal fee. Send blueprints to: **CHARLES E. ROLAND, ITASCA, ILLINOIS.**

Engineering Service

ENGINEERING SERVICES
FOUNDRY & MANAGEMENT CONSULTANTS

Cost & Scrap Reduction — Mechanization Surveys
Quality Control — Plant Layout
Process Engineering — Technical Sand Control

CARL E. ROWE & CO., INC.
500 WEST NATIONAL AVENUE
MILWAUKEE, WISCONSIN
Phone: EVergreen 4-2733

Employment Service

EMPLOYMENT COUNSEL, INC.

"All The Name Implies"

JOHN COPE, Manager Foundry Dept.

Recruiting men for employers in the foundry industry throughout the nation. Openings in Steel, Malleable, Gray Iron and Non-Ferrous—Jobbing and Production. Salaries to $20,000.

PLANT MANAGERS — SUPERINTENDENTS
GENERAL FOREMEN — MOLD FOREMEN
CORE FOREMEN — MELTING FOREMEN
CLEANING FOREMEN — MAINTENANCE FOREMEN
PATTERN FOREMEN — METALLURGISTS
INDUSTRIAL ENGRS. — TIME STUDY ENGRS.

And all other Administative and Sales Positions

WRITE or CALL for registration.

Completely Confidential.

SUITE 500
CHICAGO 2, ILLINOIS

7 WEST MADISON ST.,
FINANCIAL 6-2100

SALARIED PERSONNEL

$3,000-$25,000. This reliable service, established 1927, conducts confidential negotiations for high grade men who seek a change of connection under conditions assuring if employed full protection to present position. Send name and address only for details. Personal consultation invited. Address: JIRA THAYER JENNINGS, 241 ORANGE STREET, NEW HAVEN 10, CONN.

Representatives Wanted

SALES REPRESENTATIVE
MAGNESIUM CASTINGS

Prominent Midwestern manufacturer of magnesium castings seeking established West Coast sales agent.
Prefer man who is familiar with applications of light metal castings and who is now servicing major West Coast aircraft manufacturers.

BOX 838
FOUNDRY — CLEVELAND 13, OHIO

MANUFACTURER'S REPRESENTATIVE WANTED

Leading manufacturer of fabricated steel flasks needs additional representation.
Several openings in excellent territories available.
Direct all inquiries to:

INDUSTRIAL & FOUNDRY SALES, INC.
P. O. BOX 71
EATON RAPIDS, MICHIGAN

SALESMAN

Calling on foundries in Chicago territory to handle very profitable line. Wonderful repeat orders. Write complete qualifications and past experience selling foundries. Address: Box 792, FOUNDRY, Cleveland 13, Ohio.

MANUFACTURERS' AGENTS

To sell special nonferrous alloys on commission basis. Most territories open. Company well established in this field and in most territories can turn over active accounts. Address: Box 835, FOUNDRY, Cleveland 13, Ohio.

Available Capacity

CONTRACT MANUFACTURING FACILITIES AVAILABLE FOR

CUSTOM-BUILT
MEDIUM AND HEAVY
MACHINERY

Steel Fabricating Shop—Gray Iron Foundry
Pattern Shop—Machine Shop

OPEN TIME NOW

QUALITY WORKMANSHIP—PROMPT SERVICE
Engineering Service Available

For Complete Information, Write, Wire or Phone

ROBERT HOLMES & BROS. INC.
1-B JUNCTION AVE., DANVILLE, ILLINOIS

Foundries For Sale

FOR SALE OR LEASE
GRAY IRON—ALUMINUM—BRONZE FOUNDRY

17,000 square-foot building is 80' x 210' on 5 acres with railroad spur. Complete with modern production equipment. Six-ton capacity cupola—200 tons per month. Present owner can use 25% to 50% of production. Selling to concentrate on primary business of manufacturing. Immediate occupancy.

CONTACT:
FRANK WHEATLEY, JR.
FRANK WHEATLEY PUMP & VALVE MFR.
HALE STATION, SAND SPRINGS ROAD
TULSA, OKLAHOMA

FOR SALE

Iron and aluminum foundry located Ogdensburg, N. Y. on St. Lawrence River. Ready to operate. Fully modern steel and concrete foundry, office, shop and storage buildings. Ample yard space. Contact:

ST. LAWRENCE FOUNDRY & MACHINE CO.
90 BROAD STREET
NEW YORK 4, NEW YORK

FOR SALE

Gray iron foundry in central Michigan specializing in boat anchors, City of Flint manhole castings, all kinds of furnace castings, State Roadside Park Gates, Board of Education boiler grates, and numerous other jobs. Orders guaranteed. Must sell because of ill health. Address: Box 809, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY FOR SALE

Fully equipped jobbing and production gray iron foundry in Central Wisconsin with daily capacity up to 10 tons. $36,000 full price. Address: Box 740, FOUNDRY, Cleveland 13, Ohio.

FOR SALE

Brick and steel foundry, Southern Illinois, 160 x 320 feet, overhead monorail water transportation available. Ideal for mechanized operation, contains equipment. Address: Box 702, FOUNDRY, Cleveland 13, Ohio.

SMALL FOUNDRY FOR SALE

On New York Central Railroad side track in Lockport, New York. Floor space of molders approximately 11,000 square feet with exceptional dumping ground for disposal of slag and waste indefinitely at lowest expense over declivity on the land. Considerable foundry equipment thrown in for the price of assessed value of the real estate. Address: JEFFERSON UNION COMPANY, LOCKPORT, NEW YORK.

BRASS AND ALUMINUM FOUNDRY

Operating small jobbing and production foundry in Northwestern Ohio. Completely equipped including 36 x 42 Wheelabrator. Address: Box 818 FOUNDRY, Cleveland 13, Ohio.

CLASSIFIED ADVERTISING

Foundries For Sale

FOR SALE
GRAY IRON FOUNDRY

Foundry equipped for bench squeezer, rollover and floor work for castings up to 2500 lbs. Whiting No. 4 cupola with Spencer Turbo Blower. Good core capacity, also Wheelabrator. Capacity 10-12 tons shipments daily, with room for extension of molding floor. Adjacent RR track. Serves all New England States.

BOX 785
FOUNDRY CLEVELAND 13, OHIO

Wanted-To-Buy

WE WANT TO

BUY B U Y BUY

YOUR SURPLUS EQUIPMENT

or

YOUR ENTIRE FOUNDRY

CALL US COLLECT

LAND-WHITEHEAD EQUIPMENT CORP.

FOUNDRY MACHINERY SPECIALISTS

P.O. BOX 939 READING, PA.

PHONE: 5-4379

MOTIVE SAND SLINGER

In good operating condition. With raising and lowering arms. Late model preferred.

MEECH FOUNDRY, INC.
9906 MEECH AVENUE
CLEVELAND 5, OHIO
TEL: MICHIGAN 1-5550

MACHINERY WANTED

Induction Furnaces, Screens, Simpson Mixers, Riehle Compression Testing Machines, Pulverizers, Grinders, Conveyors. Address: **P.O. BOX 1351, CHURCH STREET STATION, NEW YORK 8, NEW YORK.**

MIXERS WANTED

Used Simpson Intensive Sand Mixers. State size, condition and lowest cash price or immediate acceptance. Address Box 578, FOUNDRY, Cleveland 13, Ohio.

PERIODICALS

Wanted to buy for cash. Back volumes and sets of Transactions Am. Foundrymen's Society and other scientific and technical Journals. Address: **ASHLEY, 24 EAST 21, NEW YORK 10, NEW YORK.**

WANTED TO BUY

Gray iron foundry located in Middle West producing squeezer or light roll-over castings. Equipment and business only. No real estate—personnel to stay. Address: Box 819, FOUNDRY, Cleveland 13, Ohio.

For Sale

FOR SALE

Model #92 Osborn Core Blower, air clamped. Equipped with 2 blow-heads: 1—22" x 12" sand reservoir blow plate surface, 11" sand reservoir; 1—12" x 10" sand reservoir blow plate surface, 12½" sand reservoir.

DUPLEX MFG. & FOUNDRY CO.
398 W. RIVER STREET
ELYRIA, OHIO
PHONE: 2353

FOR SALE

Milwaukee Jolt Rollover Draw Molding Machines. New 1944, 12" draw, 1200# and 1500# capacity. Address: **GARDEN STATE MACHINERY CORPORATION, 59 EDISON PLACE, NEWARK 2, NEW JERSEY.**

For Sale

FOR SALE

Osborn molding machine jolt rollover pattern draw, pit type pneumatic drive, draw flask 64", model 405-J.
#30 Tabor hydraulic jolt rollover pattern draw molding machine, 30" x 41" table, 12" draw.
Osborn 2047-4 jolt rollover, table 18" x 24", 8½ draw.
25—Tabor pneumatic molding machines, 10" squeeze.
Osborn molding machine portable #74.
Adams portable hand squeeze machine 13".
Wheelabrator table #2 with 8-24 multitables.
3—Pangborn 1 GF barrels, capacity 150 lbs.
Jeffrey Sanditioner, capacity 10-15 tons per hour.
Pangborn EN 2 cabinet.
Sandblasting Room, gravity feed, 7' x 13', with McLeod 2000 lb. generator.
Magnetic particle testing machine.
Hardness testing machines.
5 H.P. buffers and polishers, pedestal type.

M. ELSTEIN
370 EAST HOUSTON STREET
NEW YORK 2, NEW YORK

MUST SELL
SAND BLAST EQUIPMENT

48 x 48 Wheelabrator Tumblast, a beauty
48 x 42 Wheelabrator Tumblast, several to choose from.
Pangborn 10 ft. Multi-table blast, good condition.

Any reasonable offer for one or all of the above will be accepted, as cash and space are needed. Dealers invited.

DIAMOND SAND BLAST, INC.
5654 WEST JEFFERSON
DETROIT 9, MICHIGAN

FOR SALE
DETROIT ELECTRIC FURNACE

Type AA of 1,200 lb. cold metal or 2,600 lb. hot metal capacity, complete with mechanical and electrical equipment for melting and rocking, including oil filled transformer of 11,000 v. primary and 125 v. secondary. Presently crated but available for inspection on 48 hours notice. Ideal for high test cast irons, brasses or bronzes. Price: $9,500.00. Address: **HOPE ELECTRICAL PRODUCTS CO., 338 WILSON AVENUE, NEWARK 5, N. J.**

For Sale

FOR SALE
CLEANING EQUIPMENT

1—Pangborn #45 Type M, Blast Room with Collector.
1—27 x 36 Wheelabrator, skip hoist, dust collector.
1—Cyclone Dust Collector, 10' dia., 22" outlet, like new.

FURNACES

1—Detroit 350# Type LSA, 100 KVA with transformer.
2—Baily 75 KW Electric Arc Furnaces, Tilting Side Electrodes with Transformers.
2—Hausfeld Tilting Furnaces, Magnesium, 1200# capacity, lined.
1—Ajax Induction Aluminum Furnace, 400# capacity, like new.
7—Monarch #93 Barrel type furnaces with blowers, 1000# alum., 3000# brass.
1—#8 Whiting Cupola with GE Turbo Blower and controls.

BLOWERS

2—Spencer Turbo Blowers, 40 HP motor, 3600 CFM at 24 oz.

SAND HANDLING EQUIPMENT

1—Beardsley & Piper Tractor Sand Slinger.
4—Sandcutters, 48", 70", 76", and 80" cutting reels.

MOLDING MACHINES

2—International Jolt Strippers, type LP, #16-8.
1—Osborn 102 Bumper.
3—Davenport Jolt Strippers.
5—Osborn 142 Jolt Rollovers, 8" draw.
14—Osborn #275J Portable Cantilever Jolt Squeezers.
2—Osborn #405 Rollovers.
1—Osborn #243 Rollover.
3—Osborn #276PJ Stationary Jolt Squeezers.
3—International type "G", portable, 24" table, 10" draw.
1—Davenport 28A Rollover, max. flask 36 x 60", 12" draw, 28 x 44" table.
3—Herman Rollovers, 2—40 x 60", 1—60 x 80" tables.

LADLES

6—1000# Modern Cylindrical worm geared ladles.
2—4 ton Teapot worm geared ladles.
2—"U" type Modern worm geared reservoir ladles, 3000# cap. 34 x 60" I.D.
4—10 & 15 ton bottom pour steel ladles.

CORE BLOWERS

2—#1 Demmler, 1 Osborn #92.
1—CB 400, excellent condition.

OVENS

1—Porbeck #C-3C drawer type gas fired core oven.

AIR COMPRESSORS

1—40 HP Sullivan Air Compressor, model B-BI, #8, Serial #21661.

MISCELLANEOUS

1—55" Crane Magnet.
1—DeWalt Cut-Off Saw, 10 HP, 3/60/220-440 V.
1—Barrett Boring Mill, 27" swing, 7½ HP motor.
1—Howe Weighograph, 39 x 39", platform, 3000# capacity, electric.

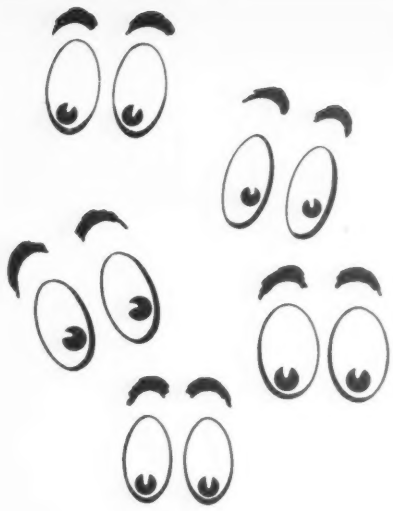
We have 200 tons of cast steel, structural steel, and sterling type floor flasks, excellent condition. Send for complete list. Also Core Plates.
WE ARE SELLING THE MECHANIZED FOUNDRY OF THE MAYTAG COMPANY, NEWTON, IOWA. SEND FOR DESCRIPTION.

UNIVERSAL MACH. & EQUIP. CO.
320 E. BROAD ST.
SHILLINGTON, PA.
PHONE READING 71321-2-3
R. B. HARRISON, FDRY. MGR.
J. P. IRWIN, ENGR.

FOR SALE

1—Milwaukee Jolt Rollover, Model No. 60-B-4, Serial No. 12471, Table size 30" x 60". Machine used only six months. Available for immediate delivery. Wire, Phone or Write:

SOUTHERN CAR & MFG. CO.
400—7th ST. SO. BIRMINGHAM, ALABAMA
TEL: 4-1714



HAVE YOU EVER NOTICED the numerous types of headings under which classified ads are listed? Whether interested in obtaining qualified personnel, selling used machinery, wanting to buy equipment, or are yourself looking for a better position, you should seriously consider advertising in the classified section of FOUNDRY MAGAZINE.

•

FOUNDRY has 45,000 readers which cover the entire foundry industry. That means that for a nominal sum you get the widest possible coverage of the industry and your advertisement reaches "just the right people".

•

The Classified Staff is equipped to handle all details in the placement of your ad.

Classified

ADVERTISING DEPT.
FOUNDRY
CLEVELAND 13, OHIO

For Sale

For Sale

WE BUY AND SELL

MOLDING MACHINES:
Jolt Squeeze
Rollover and Pattern Draw
Jolt Squeeze Pin Lift
Jolt Pin Lift

SAND SLINGERS
Beardsley-Piper

MOLD CONVEYOR
Link-Belt

CORE BLOWERS
Osborn
Demmler
Redford

SAND MULLERS
Simpson
Beardsley-Piper
Link-Belt

FURNACES
Hausfeld 500# tilt
Hausfeld 40# non-tilt

CLEANING CABINETS
Hydro Whirl f. Magnesium

VARIOUS SIZES STEEL FLASKS.

GRINDERS:
Stand, double end
Disc single & double end
Fin grinding f. cylinder heads

SHAKE-OUTS:
Simplicity
Robbins

VIBRATORS:
Jeffrey #3 and #4

SCALES:
Car and Floor

CHARGING CRANES
3 ton Sheppard

POURING LADLES
Modern & Whiting 2000#

BLOWERS
Cupola and furnace

IMPREGNATING ROOM
Complete installation

CORE OVEN
Young Brothers 2 compartment.

WE ALSO BUY AND SELL COMPLETE FOUNDRIES.

EUCLID FOUNDRY & MACHINE EQUIPMENT CO.,
15019 SARANAC RD., CLEVELAND 10, OHIO.
TELEPHONE: GLENVILLE 1-1538, 1-1222.

FOR SALE

TURBO BLOWERS WITH MOTORS

CFM	PRESS.	MAKE	CFM	PRESS.	MAKE
4500	16 oz.	G.E.	660	20 oz.	A-B
3500	40 oz.	Spencer	500	10 oz.	No.Am.
2800	1 oz.	Spencer	400	16 oz.	Spencer
2700	16 oz.	Spencer	400	4.3 oz.	Spencer
2500	7 oz.	Sturt.	340	20 oz.	A-B
2000	2½ oz.	Spencer	320	12 oz.	Spencer
2000	1 oz.	Spencer	225	16 oz.	Spencer
1150	20 oz.	No.Am.	180	15 oz.	Spencer
800	8 oz.	No.Am.	9100	7" SP	Sturt.
675	16 oz.	No.Am.	1100	4½" SP	Bayley
			100	7" SP	Spencer

THE MOTOR REPAIR & MFG. CO.
1552 HAMILTON AVE.
CLEVELAND 14, OHIO

FOR SALE

Motors, Generators, Transformers from 1 HP to 2500 HP

World headquarters for T.E.F.C. and explosion proof motors.

World's largest inventory.

ELECTRIC EQUIPMENT CO.
ROCHESTER, N. Y.

FOR SALE

No. 55 Demmler Core Blower, extra sand magazine, new 1951, used only 6 months. Excellent condition. Priced to sell.

SINKING SPRING FOUNDRY CO.
SINKING SPRING, PA.

SANDCUTTER

American, 1 year old, Model 89-70 complete. Available immediately. Change in method reason for selling.

ARCADE MALLEABLE IRON COMPANY
WORCESTER, MASSACHUSETTS
PHONE: WORC. 3-5414

PATTERN EQUIPMENT FOR SALE

First quality aluminum patterns for 4" medium soil pipe fittings. Also complete set of aluminum patterns for waterless aluminum utensils. Address: **ST. JEROME INDUSTRIES LTD., CASTONGUAY ST. WEST, ST. JEROME (TERREBONNE) QUE., CANADA, TEL: 3767.**

ELECTRIC FURNACES

Three Detroit Electric, Type LFA, 200# capacity for melting nonferrous or ferrous alloys, complete with 60 KVA transformer, 4160 primary voltage, 60 cycle and oil circuit breakers.

One spare interchangeable shell.

In good condition. Can be seen in operation.

CARL G. PETERSON
MANNING, MAXWELL & MOORE, INC.
65 GROVE STREET
WATERTOWN, MASSACHUSETTS

TESTING MACHINES

1—Riehle 400,000# hydraulic and beam type Compression Testing Machine
1—Riehle 200,000# Universal
2—Riehle 100,000# Universal
1—T. Olson 100,000#
Also Simpson Sand Mixers 18" dia. Laboratory, #0, #1, #1½, #2, #3
Miscellaneous: Screens, Pulverizers, Grinders, Conveyors—all types, Tyler Rotap Screens, etc.
OUR 36th YEAR

CONSOLIDATED PRODUCTS CO., INC.
13-20 PARK ROW NEW YORK 38, N. Y.
TELEPHONE: BARCLAY 7-0600

FOR SALE

Jolt Squeeze Machines in good operating condition. Priced for quick sale.
8 Milwaukees
8 Arcades
5 Osborns
WRITE:
C. T. JONES, PLANT ENGINEER
GUNITE FOUNDRIES CORPORATION
302 PEOPLES AVENUE
ROCKFORD, ILLINOIS

FOR SALE

AGET-DETROIT MODEL 11N50 DUST COLLECTOR. 1½" HORSE-POWER MOTOR, 1453 C.F.M. NEW CONDITION—$200.00. ADDRESS: **PETER HEALEY BRASS FOUNDRY COMPANY, P.O. BOX 834, EVANSVILLE, INDIANA.**

FOR SALE

1—66" Dia. table, cabinet type, American Wheelabrator complete with dust collecting equipment, purchased new July, 1943. Used very little. May be seen in operation. Address: **OTTUMWA BRIDGE & CONSTRUCTION CO., OTTUMWA, IOWA.**

FOUNDRY EQUIPMENT

MOLDING EQUIPMENT

Herman Jolt Rollover # 6000, 40" x 60", 1947
2—Herman Jolt Stripper, 48" x 54", 1947

Osborn Jolt Roll Over, model 405S, with Roll out Car 44" x 48"

2—275 J Osborns
1—75J Osborn
3—SPO Squeezers 110J
29—2047-4 Osborns Jolt & Draw
8—Tabor Split Pattern Squeezers
5—Haynes Squeezers
2—Adams 12 x 38 Squeezers
1—Milwaukee Squeezer
1—#332 Osborn Jolt Rollover
2—Int'l. Portable 24 x 30 Rollover
2—Tabor 31 x 40 Rollovers

SAND HANDLING EQUIPMENT

Unit A Syntron Feeder Hopper, 6' x 6'
2—Aerator, Overshot type, 9' x 2' & 4' x 3'
Aetna Sperser System
Simplicity Shaker, model C
Belt Conveyor Systems
Simplicity Gyrating Screen 2' x 3'—portable
4—Green Sand Hoppers 4 yd. cap.

CRANES & HOISTS

15—Curtis Traveling Bridges, 15' span
16—Curtis Air Hoist, 5 & 6" Cylinders, 3½' x 4' Lifts
Electrified Monorail

CUPOLA & LADLE EQUIPMENT

1—Whiting Blower 3900 CFM at 20 oz.
Roots Connersville Blower, 22 x 66, 75 hp
#7½ Roots Connersville Blower 13,000 cfm
North American Centrifugal Blower, 3000 cfm
Spencer Turbo Blower, 3500 cfm @ 40 oz.
Spencer Turbo Blower, 2250 cfm @ 16 oz.
2—#9 Whiting Cupolas
Geared Ladles—1 ton to 4 ton—tilt.

MISC. FOUNDRY EQUPT.

50" dia. Muller, single wheel
1—Schramm 25 hp Air Compressor
10,000 ft. #458 Chain Conveyor with Trolleys
Brinell-Rockwell-Riehle Testers
2—Int'l SB11 Core Blowers
Demmler #1 Core Blower
3—12 x 12 Pangborn Sand Blast Rooms, with Dust Collectors
2—Lindberg Fisher 225 lb. tilting Furnaces & Blowers
1—400# Detroit Electric Furnace
2—6000# Automatic Transporters
Baker Lift Truck, 6000# cap., 1948
Yale Lo Lift, Redi power
300 ft. 10" Logan Roller Conveyor 3½" Dia.
Logan Wood Slat Conveyor, motorized, 36" x 35' Roller Conveyor
15—Double End Grinders
#124 Gardner 53 Horiz. Grinder
1—U. S. Double End Grinder—Late
1—Standard Buffer & Polisher
Tons of Flasks
Core Blower, Champion, model CB400, 300 lb.
Roto-Clone units, 24W & 36W, with sludge ejectors
2—48 x 72 Jeffrey Vibrator Feeders
Vibrators, Osborn, 1⅝" x 2"
1—McLeod Tumbling Barrel
1—Whiting 30 x 60 Tumbling Barrels—late
2—Sand Cutters Model M
1—B & P Mulbaro
Bottom Dump, Sand Buggies
Exhaust Fans—to 60"
Exhaust Blowers—all sizes

WE WILL BUY—FROM 1 PIECE UP TO ENTIRE FOUNDRY

GREENE BROTHERS
(FORMERLY ASSOCIATED WITH ALLIED MATERIALS HANDLING CO.)
511 FREEMAN AVE.
CINCINNATI 3, OHIO
Phone: MAin 2192

For Sale

FOR SALE

MOLDING MACHINES

2—No. 275 Osborn jolt squeezers.
2—Deuscher Stationary jolt squeeze.
2—SPO #611B Stationary Oscillating Jolt Squeeze Strippers.
4—#610 Johnston & Jennings Air Jolt Rollover Draw Portable 24 x 30 table.
1—Tabor 36 x 50 table Air Jolt Rollover Draw, 3000# capacity.
2—International PKL 14"-5½" Jolt Squeeze Pin Lift.
1—Tabor Pedestal Core Rollover Hand Ram Rollover Draw 14 x 20 table 8" draw.

BLOWERS FOR CUPOLAS AND FURNACES

2—15 HP Spencer-Turbine 2250 CFM at 16 oz.
10—High temperature blowers 1400° F. 9000 to 15000 C.F.M.
2—#7½ Roots rotary blowers—27 x 81—14000 CFM.
1—Connersville rotary blower 22 x 66 45 cu. ft per revolution 9000 CFM.
Maxon-Premix Blowers for Gas ¼ to 1 HP.
2—5 HP 20-oz. Spencer Turbine Blowers.
2—2 HP 20-oz. Spencer Turbine Blowers.

METAL MELTING EQUIPMENT

1—1000# open flame brass melting furnaces, gas fired.
1—Hausfeld Stationary Brass, Multiple gas burner, 200# cap.
1—Hausfeld Tilting crucible, gas, 250# Al Cap.
1—Hausfeld 2000# aluminum capacity furnace, barrel type, open flame, oil fired.
New 32" to 41" dia. shell cupolas made to order.
New 1000 lb. aluminum cap. tilting crucible furnaces to specifications.

MISCELLANEOUS

1—Simplicity Model B Sand Conditioning Unit, 4' x 8' double deck screens with aerator for piling.
1—Stoney crane type shakeout.
1—NC-4 Royer sand separator.
1—#1 Demmler core blower.
2—#16 Roto-clone units complete.
1—McLeod Small Sand Blast Barrel 24 x 24.
1—36W Wet Type Roto-Clone 34000 CFM.
1—24W Wet Type Roto-Clone 13000 CFM.
Complete stock of rebuilt mill and dust exhaust blowers.

CLIFTON MACHINERY COMPANY
1023 W. SIXTH ST. CINCINNATI 3, OHIO

FOR SALE

1—Used Pittsburgh Lectromelt Furnace Type C-16
Side Charge 1½ ton per hour melting capacity
Complete with 800 KVA Transformer

BAY CITY ELECTRIC STEEL CASTING CO.
BAY CITY, MICHIGAN

SAND MULLER FOR SALE

5A Baker-Perkins used 1½ years since new. Taken out of operation July 29. Complete with 125 HP motor, starter, and speed reducer. Force feed oil pump to all bearings. To be sold at 60% of new price or any fair offer. Contact: **DAYTON-PORTSMOUTH FOUNDRY CO., PORTSMOUTH, OHIO, or THE DAYTON STEEL FOUNDRY CO., DAYTON, OHIO.**

FOR SALE

One No. 217-13E Milwaukee Jolt Squeeze Roll-over Draw Molding Machine. This machine has never been used and is on the original skids just as received from the factory.

REASONABLY PRICED.

NEW HAVEN FOUNDRY
NEW HAVEN, MICHIGAN

FOR SALE

Clearfield #920 Mixer, excellent condition, Serial 205-C. Complete with motor and starter. Address: **WM. P. LAYTHAM & SONS COMPANY, 925 MARKET STREET, PATERSON, NEW JERSEY.**

CLASSIFIED ADVERTISING

For Sale

SUPER SPECIAL
FORK LIFT TRUCKS

15,000 lb. Hyster Fork Lift Trucks.
6,000 lb. Clark Fork Lift Trucks.

CORE BLOWERS

#91 Osborn, #193-4 Osborn, #94 Osborn.

WHEELABRATORS

20" x 27" American Wheelabrator.
27" x 36" American Wheelabrator.
48" x 48" American Wheelabrator.

MOLDING MACHINES

Herman Jar Rollover and Pattern Draw Machine. New in 1944; 48" x 144"—10,000# Series. Rollover Ser. No. 1812; solid cylinder jolt machine Ser. No. 4167; read discharge roller conveyor complete; No. 4 (1½") Electro Pneumatic Timing Device 115 volts, 60 cycles; 2 sets 6000# Pneumatic Flask Clamps complete with special holders (Like New Condition).
Herman Jar Rollover and Pattern Draw Machine 80" cap.; 6000# Series.
30" x 36"—#1500 Series Hi-Speed Herman Pneumatic Jar Rollover and Pattern Drawing devices with 26" x 30" plate—8½" cylinder jarring molding machine. 16" draw; max. flask size is 36" long—30" wide—16" high.
International JDP Pattern Draw Machine 600 lb. cap.; 8" draw; on wheels; table size 20" x 22".
#2047 Osborn Jolt Rollover Pattern Draw molding machines.
#601—13 Osborn Jolt Rollover Pattern Draw molding machines.
#405 Osborn Rollover molding machine, 79" table.
#413-3 Osborn Jolt Rollover Pattern Draw molding machine; 130" x 42".
Osborn #275 J Jolt Squeezers.
SPO Model 914 Jolt Rollover.
#1 Johnston & Jennings Jolt Squeeze Strip molding machine.
#146-2 Milwaukee Jolt, Squeeze, Strip, Roll-on, Roll-off molding machine with power swing arm. Max. flask size 18" x 30" x 8". New in 1952.
SPO #3058, special jolt, pin stripping molding machine with 23" x 27" table, pins adjustable 14" to 22" x 19" mounted on wheels.

MISCELLANEOUS

Stroman Aluminum Furnace—reverberatory type; 1200 lb. cap.; gas fired; with skip hoist and hydraulic tilting equipment.
Beardsley & Piper Tractor Type Sandslinger—with magnetic tower—13' arm.
#404 Clearfield Mixer.
Marschke Swing Frame Grinder—10 HP.
Beardsley & Piper Screenerator.
#6 Whiting Cupola Blower.

FOR THE BEST DEAL
CALL
BALCHER MACHINERY COMPANY
1884 S. COMPTON ROAD
CLEVELAND HEIGHTS 18, OHIO
TELEPHONE: FAIRMOUNT 1-1186

FOR SALE
NEWAGO UNITS (NEW 1953)

One twin overhead hopper Handy Sandy with air operated hydraulic sand gates.
One elevator tower with aerator.
One feeder hopper with conveyor belt to elevator tower.
One Reddy-Sandy shakeout unit with moistener and aerator delivering condition sand to feeder hopper.
One #1 Demmler core blower.

FOUNDRY SUPPLY COMPANY, INC.
5009 EXCELSIOR BOULEVARD
MINNEAPOLIS 16, MINNESOTA

MOLDING EQUIPMENT FOR SALE

Osborn Jolt Rollover No. 405. 12" draw, 33 x 42. Never used, at less than half price. Opportunity for broker. Address: **JOHN GODLESKIE, 8430 GRAND RIVER, DETROIT 4, MICH. TYLER 7-6733.**

FOR SALE

We have recently purchased a large well-known foundry in a Chicago suburb. All items marked * are from that foundry, are still in place, and may be seen in operation. Special prices have been placed on these items before we must move them.

AIR COMPRESSOR

Ingersoll Rand Type 10—14 x 9 x 12, 2 stage, 75 HP, 3/60/220/1200 rpm synchronous motor, 350 CFM at 100#.

BLOWERS

Spencer Turbo Blower 2250 CFM @ 16 oz., 15 HP, 220/440 V motor. New 1946.

Ingersoll Rand SF24, 400 CFM, 3.75 PSI.

Buffalo 7E, 3500 CFM @ 32 Oz. 50 HP 220-440 V/3535 rpm motor.

CONVERTER

100 KW Rotary Westinghouse 220 V 60 cycle primary 250 V DC, complete with controller and panel.

CORE BLOWER

Demmler #3E Dropaway Draw. New 1946.

CRANES

5 Ton P & H Overhead Elec. Traveling **Crane, 30'6" span, 15' lift (can be increased)** 3 motor, 220 V A.C. New 1946.

5 Ton P & H Overhead Electric 20'5" span, electric hoist, hand travel both ways, P/B control 440 V A.C.

10 Ton Northern Overhead Elec. Traveling Crane, double girder, fish belly, 3 motors, 230 V D.C., 54'7½" wide C to C **of wheels can be cut down to fit** smaller size.

CRUSHERS—PULVERIZERS

2—Stedman 15" x 12" Type A. One with 10 HP 220-440 V motor. One without motor.

7—Prater Blue Streak Pulverizers, 30 HP motor.

ELECTRIC FURNACES

Detroit 200# Type LF 100 KW with transformer for 440 V primary.

Detroit 350# Type LFA 230 KVA transformer 13,200 primary volts.

FIRE EXTINGUISHERS

St. Regis Model 181 Dry Powder for magnesium fires.

Buffalo 50 gal. soda-acid cart type.

GRINDERS

Fox 10 HP 3/60/220 V Swing Frame.

U. S. 15 HP, 3/60/440 V Swing Frame.

McCabe High Speed Double End, 2" x 24" wheels.

Ransom 8 B Double End 2" x 20".

Fox 15 HP Swing Frame.

2—Hammond 20 WR-2, 3" x 24" wheel, 20 HP motor.

2—Swing Frame Fox Model 4, 24" dia. wheels, 60" arm, V belt drive, 15 HP, 3/60/220-440 V.

2—Heavy Duty Swing Frame Marschke, 20 HP, 3/60/220-440 V motor, 24" x 3" wheel, 3 speeds, 9200 rpm. max. speed.

HOISTS

500# American LoHed.

1000# Cleveland 220/440 V.

1000# Detroit 220/440 V.

5—1000# P & H Hevi Duty with trolley.

2—2000# P & H Hevi Duty with trolley.

2000# Detroit Electric.

2000# American LoHed.

11—4000# P & H Hevi Duty with trolley.

2—4000# P & H Hevi Duty with trolley and powered drive unit for moving hot metal.

2—5 Ton Air Hoists with motor driven trolleys.

LADLES

3 Ton Whiting geared ladle. Like new.

5 Ton Whiting Mixing Ladle on wheels.

*Whiting 29" dia. top geared.

*Whiting 34" dia. top geared.

*Whiting 46" dia. top geared.

*Whiting 20½" dia. top geared.

*Whiting 1 ton geared.

*Whiting 2 ton geared.

*Whiting 2 ton geared.

*Whiting 8 ton geared.

*Whiting 12 ton open spur geared.

*Whiting 3 ton geared.

*Whiting 6 ton geared.

*Whiting 1 ton truck ladle.

MOLDING MACHINES

2—Champion Pin Lift Pushoffs, 44" x 44" x 12".

2—Champion Pin Lift Pushoffs, 46" x 46" x 12".

1—Champion Jolt Squeeze Strip Molding Machine, column type, 12" jolt cylinder 8" lift, 18" x 21" table.

1—Champion 24 Hand Clamp rollover 26" x 16" table.

1—Herman 20" x 30" Rollover Pattern draw 6" bumper.

1—Herman 4000# High Speed Rollover 30" x 60" with 32" x 48" bumper, 13" cylinder pattern device.

2—Herman 20" x 24" Jolt Rollover Pattern Draw, Like New.

1—Osborn 601-13 Portable Jolt Rollover Pattern Draw, 30" x 24" flask size, 10" draw, 900# cap.

1—Molding Unit, consisting of Osborn 23" x 24" table, Jolt squeeze and Osborne **17" x 24" 814P Rollover with overhead** hopper for each machine, 1 with bottom dump, other with flat belt sand delivery.

1—Tabor, 1000# Rollover 30" x 5', Excellent condition.

2—International Type G.

Davenport Jolt Rollover Pattern Draw Portable

2—Milwaukee 165 Jolt Squeeze Strippers, late type, excellent condition.

*Herman 4000# Jolt Rollover Pattern Draw. New 1946. Used very little since then.

MULLERS AND SAND CUTTERS

Simpson #1.

Simpson #2, bucket loader, motor on base plate.

Simpson #3, motor on base plate.

Simpson #3, Type H.

Clearfield #404, 5 HP 440 V motor.

Kwick Mix Paddle type portable.

Royer Jr. Sand Separator and Blender.

*Royer Sand Separator

*Royer Sand Separator and Blender

*#2 Simpson Mixer Open Gear Type. Used on core sand with loader and bucket to service core benches.

*#3 Simpson Mixer Open Gear Type.

American Sand Cutter.

ROD STRAIGHTENER

Pneumatic Guillotine Type.

*2 American Guillotine Type, one with gager bender.

ROTOBLAST

Pangborn, table with 3-8" rotating work tables, 3 position loading, cleaning and touch-up designed for work similar in size to aircraft cylinders. Like New condition.

SHAKEOUTS

1—3' x 5' Link Belt.

2—4' x 6' Simplicity.

SLINGER

B & P Motive Type, 19", two speed head, 25 HP, Perma Magnet, bucket elevator to load tank, storage bin with conveyor to elevator.

SPEED REDUCERS

Cleveland 408-R1, 36 to 1, 20.5 HP.

Falk Motoreducers 7½ HP.

U. S. Syncrogear Motors 7½ HP.

U. S. Syncrogear Motors 5 HP.

TUMBLING BARRELS

*Whiting 30" x 48"

*Whiting 48" x 60"

*Whiting 48" x 72"

MISCELLANEOUS

*Foundry Sand Crane Self-dumping buckets.

*2 Blaw Knox Low Headroom Foundry Sand Pickups for over crane use.

***We have a large Hydroclone Dust Collector like new, now equipped to take dust both from shakeout and grinders.**

ACME EQUIPMENT CO., INC.

WE WILL BUY FOR CASH A SINGLE PIECE OF EQUIPMENT OR YOUR ENTIRE FOUNDRY.

126 South Clinton Street Phone: Andover 3-3430 Chicago 6, Illinois

ANOTHER FIRST FOR AAA MACHINERY & EQUIPMENT CO.

$100,000.00 WORTH OF MODERN FOUNDRY EQUIPMENT

ALL NEW IN 1951-1952

PURCHASED FROM

AMERICAN DISTRICT STEAM CORP.

NORTH TONAWANDA, N. Y.

MUST BE LIQUIDATED FROM PREMISES IN 30 DAYS.

AAA Machinery & Equipment Co.

MOLDING MACHINES

1—HERMAN PNEUMATIC 40" x 60" 15" Solid Cylinder Jarring Molding Machine, Heavy duty Bumper Type. Equipped with No. 12-15 Des. 2 Bumper control valve.
5—S P O No. 110J Portable Jolt Squeeze Machines, complete inverted Jolt. Cantilever type Squeeze Head.
1—S P O No. 507 Rollover, Jolt Pattern Draw.
1—Osborn No. 710PJ Squeeze Machine.
10—Osborn No. 275 J Jolt Squeeze Machines.
1—Osborn No. 242 W Jolt Rockover Pattern Draw Molding Machine. Serial No. 12722C—Flask length overall—open end Flask width outside—30" Combined flask space and Pattern draw stroke—31" Jolt cylinder diameter —6½" Jolt capacity at 80# air pressure—1500# Pattern draw stroke—12x19" Rockover table size—29x42".
1—Johnson & Jennings Model 1216S Stationary Jolt Pin Lift Machine, table size 36" x 54", draw 16", capacity 3000 lbs.
1—Johnson & Jennings Air Jolt Machine, 14" x 20" Table size. 3" Cylinder, 3000 lbs. cap.
3—Milwaukee Model 123-12 Jolt, Squeeze Machines, 12" cylinder, 17" x 26" table.
1—Davenport Model 2S Jolt Roll Over, Pattern Draw, table size 28" x 40", 12" draw, 1500 lbs. capacity.

GRINDING EQUIPMENT

2—Fox No. 3-A High Speed Stand Grinder. Wheel size 20" x 2" x 10". 5 H.P. motor.
1—Hammond Model WR-1 Double End Snagging Grinder, 7½ H.P., 220/440/3/60.
2—Hammond Model WH-10 Double End Grinders with (2) 7½ H.P. 220/440 3 phase, 60 cycle, wheel size 20" x 2" x 2".
4—Mummert Dixon Swing Grinders, Model No. 2016, 10 H.P., 220/440 volt motor, wheel size 20" x 3" x 10".

CUPOLA — WHITING EQUIPMENT — SKIP HOIST

1—Whiting Cupola, size 6—42" diameter melting zone, 6 Tuyeres melting capacity 8TPH.
1—No. 7E Buffalo Forge Blower with G.E. 40 H.P., 3600 RPM 220/440 volt, 60 cycle, 3 phase Induction Motor. Serial No. 6096170.
1—Cupola Lighter Tank, Hose and Torch.
1—27½" diameter Straight Side Open Ladle.
1—Whiting No. 6 VSD Skip Hoist Cupola Charger with 18.75 cu. ft. Bucket arranged for mounting on charging floor (never uncrated). (Will sell with or without Cupola.)
1—Cast iron charging door ring composed of six segments to be mounted in cupola at stepback of lining. Will sell as unit or individually.

ELECTRIC FURNACE

1—Detroit Electric Furnace, Type LFY, 175 KW, 700 lbs., serial No. 177K for melting ferrous and non-ferrous alloys. (Never uncrated.)

HOISTS—AIR

4—Ingersoll-Rand Air Hoists, 4000 lbs. capacity, size D, complete with low overhead trolley.
1—Ingersoll-Rand Air Hoist, 10,000 lbs. capacity, size E, with low overhead trolley.

CORE BLOWER

1—Redford Core Blower No. 1, Cartridge Bench Type. (Never uncrated.)

FARQUHAR "UNDERCAR UNLOADER" AND PORTABLE "TROUGH CONVEYOR"

1—A. B. Farquhar Company, 18" x 19' Model "341" Undercar Unloader, Serial No. Y27286, equipped with I C belt, 5 H.P., AC, 3 phase, 60 cycle, 220/440 volt Baldor and waterproof starter.
1—A. B. Farquhar Company, 18" x 40' Model "343" Trough Conveyor, Serial No. Y27287, equipped with I C belt, 5 H.P., AC, 3 phase, 60 cycle, 220/440 volt Baldor motor with waterproof starter, 3 sided feed hopper. (These 2 units were used in conjunction with each other, but can be had individually.)

SAND CONVEYOR

1—A. B. Farquhar Company, 24" x 167' Model "346-3" Sectional Trough Conveyor; Serial No. Y27288D, equipped with plain belt, 15 H.P., AC, 3 phase, 60 cycle, 220/440 volt Baldor motor with waterproof starter and pushbutton, 110 volt control circuit relays, two way tripper with rails, and receiving hopper.

ROLLER CONVEYORS

16—Section 11' wide x 10' long, 1¼" x 3½" steel channel sides, 2" diameter x 8" long.
3—Sections 11" wide x 5 ft. long, 1¼" x 3½" steel channel sides 2" diameter x 8" long.
4—Sections 11" wide x 5 ft. long, 1¼" x 3½" steel channel sides 2" diameter x 8" long.
6—Sections 17" wide x 10 ft. long, 1¼" x 3½" steel channel sides 2" diameter x 14" long.
2000'—Matthews Gravity Roller Conveyor 20", about rail, 2½" rollers on 3" and 4" centers, heavy duty. (Like New).

OIL FIRED CONVERSION EQUIPMENT

1—Oil-fired Hauck Burner No. 781, complete with controls, air heater.

AMERICAN 27" x 36" WHEELABRATOR —DUST COLLECTOR—SKIP HOIST

1—27 x 36 American Wheelabrator Tumblast Steel Apron Conveyor, complete with electrical equipment for 220/440-60-3 10 H.P., 1800 RPM, 1800 RPM Wheelabrator Motor, 1 H.P., 1800 RPM Mill Motor, ¾ H.P., 1800 RPM Elevator Motor, 4-motor control panel, 7-button Push Button Station, Hardened vented Hub Wheel. American Tumblast Loader—Pit Type, complete with electrical equipment for 220/440-60-3, 2 H.P., 1800 RPM Loader motor, heavy duty three element push button station, Time signal clock for 110-60 single phase. Blast gates: one complete set for W/A T/B. Existing spare parts included. Used 6 months—can be had with or without Dust Collector.

TYPE "CH"—2 DUST COLLECTOR—PANGBORN

1—No. 495 Casing (reinforced) consisting of: 1 No. 41 Type TC spark arrester section; 1 No. 447 Type CH-2 screen dust collector; 1 structural steel support for above; 1 No. 9 type KV-3 steel plate dust exhauster (Buffalo Forge Blower); 1 multiple V-belt drive for exhauster, 1 No. 43 type CH Fan and motor housing; 1 No. 43 structural steel support for housing. 6630 Cfm.

LADLES AND POURING DEVICES

2—Modern Equipment Co., Serial No. 2725 and 2664. F6000 Model F pouring device 3'—0" lift (F 5030) with F1730 handwheel 30" diameter and F35 yoke.
2—15" Taper covered Ladle with No. 1 type shank HS-7, R. B. T's and detachable bail without crane hook eye.

DIETERT SAND TESTING EQUIPMENT

1—No. 250 Lab. Balance; 1 Set No. 260 Balance Weights; 1 No. 275 Moisture; 1—No. 315 Sand Rammer; 1—No. 320 Permeability Meter; 1—No. 440 Sand Strength Machine, motor drive accessory; 1 Compression Instrument; 1—No. 540 Compb. Lab Sifter.

MONTHLY SPECIALS

MOLDING MACHINES

3—**OSBORN** #559 HD Jolt Strippers, stationary, Table 25" x 30" 650.00
*2—Osborn #331 Jolt Rollover, Squeeze and Pattern Draw. 850.00
1—Osborn #333 H Jolt, Squeeze, Power Rollover, Pattern Draw, 2000 lbs., Jolt, 22" x 44", Table. 1750.00
2—Osborn #332 Jolt, Squeeze, Rollover, Pattern Draw, Flask Size 25" x 36". .. 1250.00
6—Osborn #2047 Jolt Rollovers..... 175.00
5—International Type "R" Hand Ram, Hand Turnover, Foot Draw Machines. 125.00
6—Osborn Jolt Squeezers #75J. 100.00
3—**INTERNATIONAL** Model PKL, Jolt, Squeeze, Air Pin Lift Machines. 325.00
2—International Type "RJ" Jolt Ram, Hand Turnover, Foot or Hand Lever Draw Machines. Various Sizes. 275.00
4—International Type G, Air Jolt, Air Turnover Foot Draw Machine, 20" x 8" .. 475.00
1—International Type G, Air Jolt, Air Turnover Foot Draw Machine, 30" x 8"... 575.00

SAND BLASTING EQUIPMENT

1—Pangborn Air Blast Cabinet, Model EN2, Size 5' x 3' x 7'1" high, with Dust Collector. 550.00

LIFT TRUCKS

2—Baker Raulang Electric Fork, 4000 lbs. cap., 119" lift, completely explosion proof. Like new. Must see to appreciate. Costs new $8000.00. A steal at..... 1750.00 each

ELECTRIC HOISTS

1—Shaw Box Load Lifter, 4000 lbs. cap., 220/440, NEVER USED 450.00
2—Yale & Towne, 2000 lbs, cap., heavy duty, totally enclosed motors, explosion proof, completely rebuilt, 1 with powerized trolley. 350.00

TESTING EQUIPMENT

1—Riehle, 100,000 cap., Screw type 650.00
1—Riehle, 150,000 cap., Screw type.... 750.00

LADLES

1—Whiting Ladle, 2 tons, tilting, totally enclosed gearing, nose pouring..... 400.00
1—Barrel type Pouring Ladle, 300 lbs. cap. 200.00

CONVEYORS—Apron • Roller • Belt

1—12' Powerized Belt Conveyor, 24" belt.... ..... 350.00
1—18" x 24' Apron Conveyor, Steel Link Belt, with motor and drive..... 1500.00
1—24" x 20' Apron Conveyor, Steel Link Belt. 850.00

SHAKEOUTS

1—Simplicity Shakeout, 5' x 7'. 1250.00
1—Simplicity Shakeout, 4' x 6' 750.00
2—Simplicity Shakeouts, 4' x 8' 1250.00

SAND SLINGERS

B & P 16" Head 4" Tip. 10' Arm. Double Belt model with plate feeder. Ser. #425.$4500.00

CORE BLOWERS

1—Osborn #91 Core Blower 650.00
2—Osborn #92 Core Blowers 850.00
1—Demmler #2 Core Blower 900.00

MULLERS

1—Simpson #2 Sand Muller. Complete with motor & drive. Open Gear Type.... 1250.00
1—Simpson #3 Sand Muller, Open Gear Type. 1750.00

SAND EQUIPMENT

1—Royer #2, Sand Conditioner 325.00
*1—Royer #NDP Sand Conditioner. 500.00
1—Jeffrey Type "P" Sand Conditioner, Class B Mixer, Portable, Serial #377..... 325.00

MELTING FURNACES

2—Fisher Melting Furnaces, Model MNP, Gas Fired, Nose Pouring, 1700 lbs. Capacity Aluminum, Electric Tilting..... 1250.00

CORE OVENS

1—Coleman Core Oven, gas fired, 4 doors opening into single compartment, 42" wide, 50" high, and 31" deep. 450.00
1—Young (3) Compartment Pull Drawer Oven, FOR MAGNESIUM, each compartment 6'6" wide x 5'9" deep, x 7' high inside, (3) Drawers to compartment. Electric heating for temperature of 800°. FOR HEAT TREATING, DRAWING OR STRESS RELIEVING. Cost 20,000. Like New. 2000.00

HEAT TREAT FURNACES

1—Eclipse Gas Fired Furnace, 4 burners, 18" x 20" x 60" inside dimensions, with motors and blower, 1944 Machine..... 750.00
1—American Gas Furnace Model DC, 10" x 16" x 26" 1600° to 2350° F. 375.00

BLOWER

North American 7½ H.P. 16 oz. 1050 CFM. Like New 375.00

AAA MACHINERY & EQUIPMENT CO.

Phone Liberty 1-6545 • 856 Eddy Road • Cleveland 8, Ohio

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Dear Reader:

Quote: We've always enjoyed quoting publisher - printer - writer Bill Feather's comment to the effect that *"you can judge a man's age by the degree of pain with which he accepts a new idea!"* In spite of our daughter's estimate of our age (at times), we risk a few comments on some foundry folks who have "grown old" and have developed a faculty, apparently, for accepting enough new ideas to show important progress over a few decades of working and earning a living.

—o—

Anniversary: J. B. Arthur, President of the Mexico Refractories Company, received his twenty-year pin at service award ceremonies held outside of their Mexico, Missouri plant recently. The occasion commemorated the twenty-third anniversary on which the first carload of firebrick left their plant. A total of 333 employees received lapel pins for five years' or more service to the company during the celebration. Among them was our friend, Sam Groff, advertising manager, who also received his twenty year pin.

—o—

Penton, too: our own organization will have held its annual Veteran's Luncheon by the time this appears in print. FOUNDRY is proud of its 28 associates who qualify as "veterans" with ten or more years' service. Including only those who have occasion to contact our readers directly, FOUNDRY veterans recently honored were: 40-*year-service*—G. O. Hays, President of Penton Publishing Company, A. L. Klingeman, Regional Manager, Ed Kreutzberg, Washington editor, Carrie B. Niles, reprint department, "Polly" Pelott, for many years Chicago District Manager (now Regional Manager of our sister publication *Steel*).

35-*year-service* — Earl Shaner, Chairman of the Board of Penton, Ben Price, New York editor, Harry Richey, staff artist, Elsie Ihlenfeld, Penton's Foundry List and Book department, Jack Ahrens, Eastern Regional Manager. 30-*year-service*—Pat Dwyer, Engineering editor, Erle Ross, Chicago editor, Frank G. Steinebach, THE editor himself, Joe Fuller, West Coast Regional Manager, Vincent Delport, London Office editor and manager, and Don Cadot, Art editor.

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25-*year-service*—Edwin Bremer, Metallurgical editor, William G. Gude, Managing editor, and Russell C. Jaenke, Director of Advertising.

20-*year-service*—Rand Ebersole, Circulation Manager, and George A. Pope, Business Manager. 15-*year-service*—Harold Dunne, circulation sales representative, and Teresa Kamerman, New York office secretary. 10-*year-service*—Aleda Hagen, Chicago office secretary, Mary Jane Kimpel, manager of advertising service, Virginia Harms, assistant editor, Richard Strnad, Production manager, Virginia Taylor, assistant editor.

We're old enough to know the value of fresh ideas. We expect each monthly issue of FOUNDRY to reflect our day-to-day search for ways and means of serving foundrymen better.

—o—

Half-Century Club: Last year, we reproduced our first (September 1892) issue. It was and is an interesting 32-page "collector's item." Jeanne Franklin of our Business Staff has been guarding the few extra copies remaining but will gladly send a copy to any readers who will write for one.

We recently asked Mary Jane Kimpel, advertising service manager, to check records and tell us the names of current advertisers who were "in" FOUNDRY prior to 1903. Allowing for unintentional error in our overlooking companies who may have changed their names since then, the following were advertising in FOUNDRY 50 years ago as they are today:

American Blower Company
The Adams Company
Ajax Metal Company
American Bridge Company
Buffalo Forge Company

Carborundum Company
Chicago Pneumatic Tool Company
Chisholm-Moore Hoist Company
Cleveland Chaplet Company
Wm. Demmler & Bro.

Dings Magnetic Separator Company
Eastman Kodak Company
Hickman Williams Company
Link Belt Company
Manning, Maxwell & Moore

Osborn Mfg. Company
Pickands, Mather & Company
Roots Connersville Blower Co.
W. W. Sly Company
Smooth-on Mfg. Company

Tabor Mfg. Company
Frederic B. Stevens
U. S. Graphite Company
Whitehead Brothers
Whiting Corporation

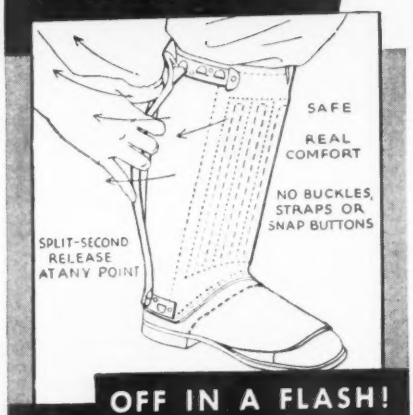
From time to time in future issues, we will reproduce early copy of these "50-year" advertisers.

Business Manager

WHEELER

WHY BE HALF SAFE!

PROTECT YOUR MEN WITH LEG-SAFE LEGGINGS

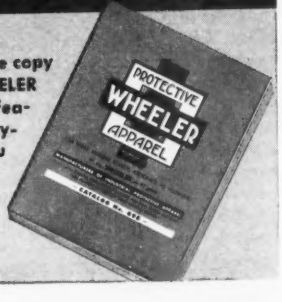


OFF IN A FLASH!

The safest leggings available! Just grab the side stay anywhere and they're off in a flash. Made in knee length or half-length in asbestos, duck, chrome leather and fibre. Also spring frame styles. A complete line to meet every need. *Your men need 'em! Get 'em today!* Wheeler Protective Apparel, Inc., 232 W. Huron St., Chicago 10, Ill.

LOOK TO WHEELER FOR A COMPLETE LINE OF SAFETY CLOTHING

Send for free copy of the WHEELER BULLETIN featuring everything you need in SAFETY apparel.



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TYPE C
STEEL SLOTTED VENT — Thin head, chrome plated, use in flat surfaces of core boxes. Slot widths .010", .013" and .015".

DEMMLER

PRECISION CORE BOX VENTS

TYPE H
SCREEN VENT — Brass body with stainless steel wire mesh. Standard meshes No. 30, No. 40 and No. 50 available.

TYPE L
LECTROMESH VENT — Brass vent, head made of .010" thick Lectromesh sheet, with .022" square holes.

TYPE A
PERPORATED VENTS — Head of brass perforated sheet, .016" thick. Hole sizes: No. 00 (.020" dia.), No. 0 (.024" dia.) No. 1 (.027" dia.), No. 2 (.033" dia.)

TYPE B
PERFORATED VENTS — Staggered slots, .020" x .115"; brass vent with head of brass perforated sheet.

Write for literature

WM. DEMMLER & BROS.

KEWANEE

ILLINOIS

STATEMENT OF OWNERSHIP

Statement required by the Act of August 24, 1912, as amended by the Acts of March 3, 1933, and July 2, 1946 (Title 39, United States Code, Section 233) showing the ownership, management, and circulation of FOUNDRY, published monthly, at Cleveland, Ohio, for October 1, 1953. 1. The names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, The Penton Publishing Co., 1213 West Third St., Cleveland, O. Editor, Frank G. Steinebach, 1213 West Third St., Cleveland, O. Managing editor, William G. Gude, 1213 West Third St., Cleveland, O. Business manager, George A. Pope, 1213 West Third St., Cleveland, O. 2. The owner is The Penton Publishing Co., 1213 West Third St., Cleveland 13, Ohio. Names and addresses of stockholders owning or holding 1 percent or more of total amount of stock: Edwin C. Barringer, Washington, D. C.; Samuel E. Bool, Cleveland, Ohio; County National Bank and Trust Co. of Santa Barbara, Santa Barbara, Calif.; J. R. Dawley, Cleveland, Ohio; Mrs. Frances Penton Force, Lansing, Mich.; Mrs. Agnes T. Hays, Cleveland, Ohio; George O. Hays, Cleveland, Ohio; R. C. Jaenke, Cleveland, Ohio; Leona F. Jasper, Pittsburgh, Pa.; A. L. Klingeman, Cleveland, Ohio; J. D. Pease, Mount Dora, Florida; Francis O. Rice, Cleveland, Ohio; E. L. Shaner, Cleveland, Ohio; Charles J. Stark, Cleveland, Ohio; Penelope M. Stark, Cleveland, Ohio; The Wean Engineering Co., Inc., Warren, Ohio; Edith L. Werner, Cleveland, Ohio; Grace Whelan, Santa Barbara, Calif. 3. The known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are New England Mutual Life Insurance Co., 501 Boylston Street, Boston 17, Mass. 4. Paragraph 2 and 3 include, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting; also the statements in the two paragraphs show the affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner. Frank G. Steinebach. Sworn to and subscribed before me this 29th day of September, 1953. Joseph P. Lipka. (My commission expires Sept. 9, 1955)

Master Power

HARD CHROMED • PORTABLE PNEUMATIC TOOLS

DO MORE WORK AT LESS COST

because they deliver more power per cubic foot of air consumed, are light in weight for easier maneuverability and they retain their new tool power longer.

ARE PREFERRED BY OPERATORS

because they are lighter in weight, better balanced and designed to reduce shock and be free from vibration.

IF YOUR PROBLEM INCLUDES

chipping, ramming, grinding, buffing, sanding or wire brushing, *write us today for full particulars.*

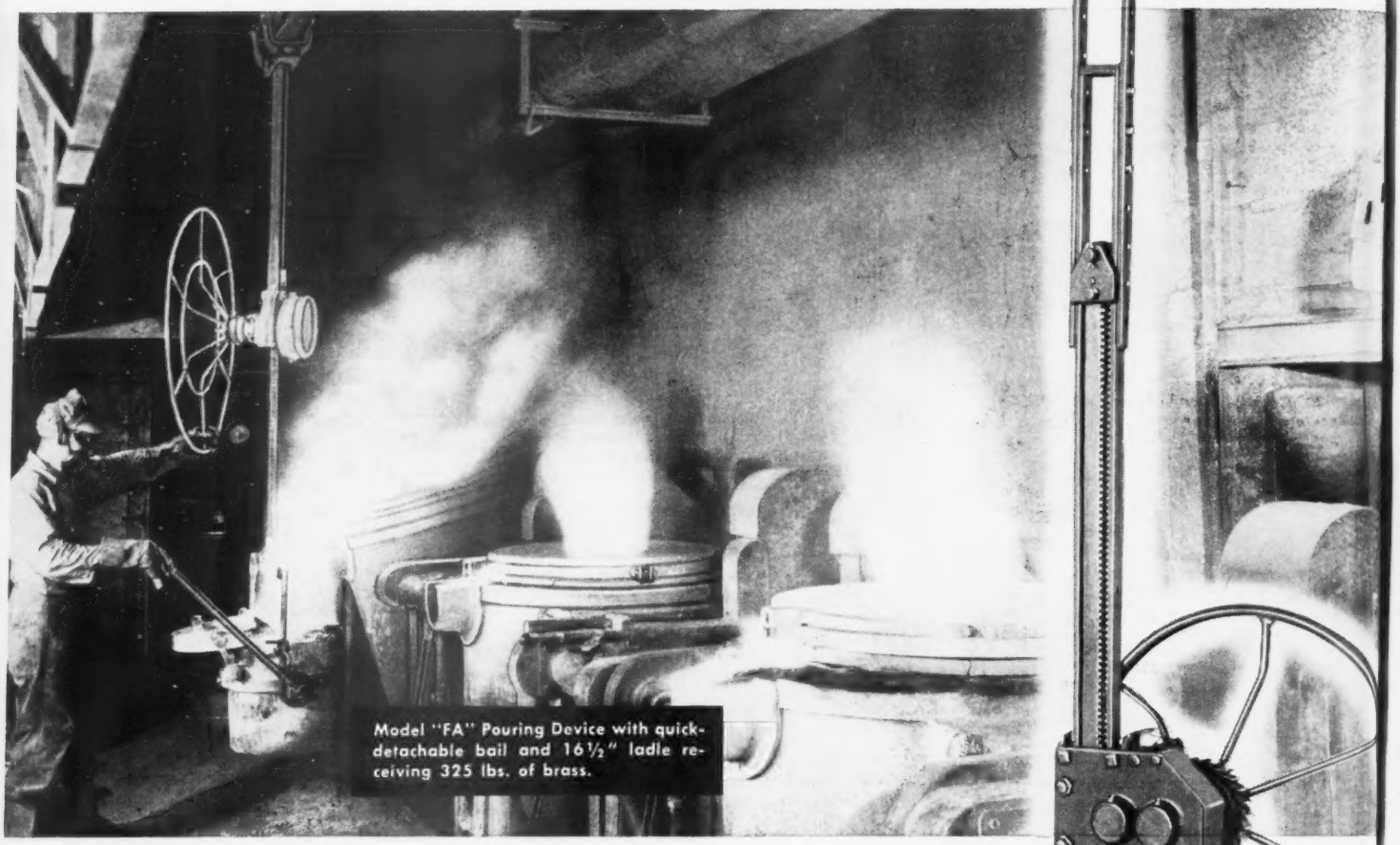
THE MASTER PNEUMATIC TOOL COMPANY, INC.

ORWELL, OHIO • U. S. A.

SALES • SERVICE • STOCK • COAST TO COAST

MECHANICAL HANDS

FOR YOUR POUR-OFF MEN . . .



Model "FA" Pouring Device with quick-detachable bail and 16½" ladle receiving 325 lbs. of brass.

Working Together with Practical Foundrymen . . .

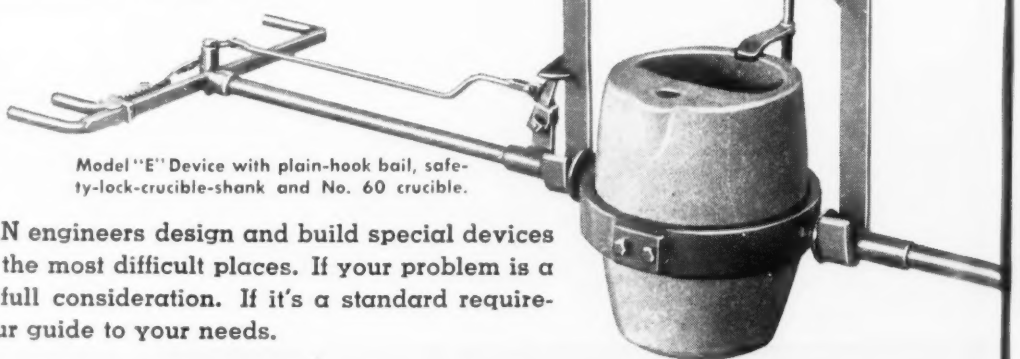
MODERN engineers developed the mechanical Pouring Device . . .

Quickly taken for granted were the vastly increased tonnages at the pay scales, improved quality of castings and lowered costs. In later years SAFETY methods and HAPPIER working conditions, which were brought about by the Pouring Device, won further acceptance for mechanical pouring.

Today in thousands of foundries everywhere MECHANICAL HANDS, with human-like precision, reach in to lift out heavier loads of white-hot metal. Each new application suggests other and expanded uses:

For Both Ladles and Crucibles

MODERN pouring Devices in four, basic, standard designs in a broad range of lifts and for metal loads from 100 to 1000 pounds is but half the story. There are specials, too! MODERN engineers design and build special devices to do the reaching and lifting in the most difficult places. If your problem is a special one write it up for our full consideration. If it's a standard requirement the coupon can serve as our guide to your needs.



Model "E" Device with plain-hook bail, safety-lock-crucible-shank and No. 60 crucible.

MODERN EQUIPMENT CO.
PORT WASHINGTON, WISCONSIN

MODERN EQUIPMENT CO., DEPT. F-11, Port Washington, Wis.

Mail to my attention:

Catalogs on metal pouring systems and ladles ..... ☐
Cupolas and cupola chargers, 147-A ..... ☐
Cranes and monorail systems, 150 ..... ☐
More information on FREE use of Modern films ..... ☐

Company .....

Street ..... Zone .....

City ..... State .....

Att'n of .....

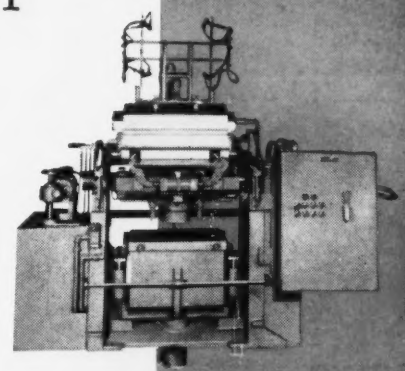
STEVENS TAKES ANOTHER STEP FORWARD
IN FOUNDRY LEADERSHIP

FREDERIC B. STEVENS, INC.
and
SUTTER PRODUCTS COMPANY

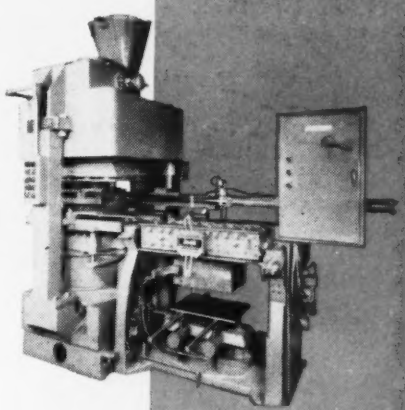
take great pleasure in announcing the appointment of Frederic B. Stevens, Inc. as exclusive sales agent for Sutter Automatic Foundry Equipment and the revolutionary Sutter Shell Molding Machine.

Over 70 years of progressive customer service by Stevens again pays off for you! With their appointment as sole distributor of Sutter Foundry Equipment, Stevens has taken another step forward in bringing the foundry industry its most modern development.

Your friendly Stevens Sales Engineer will be glad to give you all the technical material and facts on Sutter Automatic Foundry Equipment — including the famous Sutter Shell Molding Machine — acclaimed by foundrymen as one of the great advancements in the foundry field.



Sutter Automatic Shell Molding Machine.

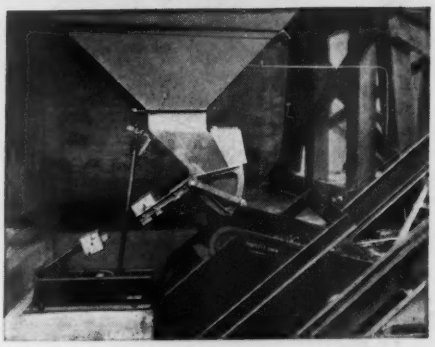


Sutter Automatic Core Blower with double rollover.

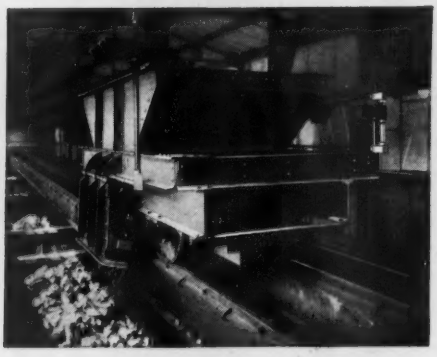
FREDERIC B.
STEVENS
INCORPORATED
EVERYTHING FOR A FOUNDRY
DETROIT 16, MICHIGAN

BRANCHES: BUFFALO • CLEVELAND • INDIANAPOLIS • NEW HAVEN
IN CANADA: FREDERIC B. STEVENS OF CANADA, LTD., TORONTO • MONTREAL • WINDSOR

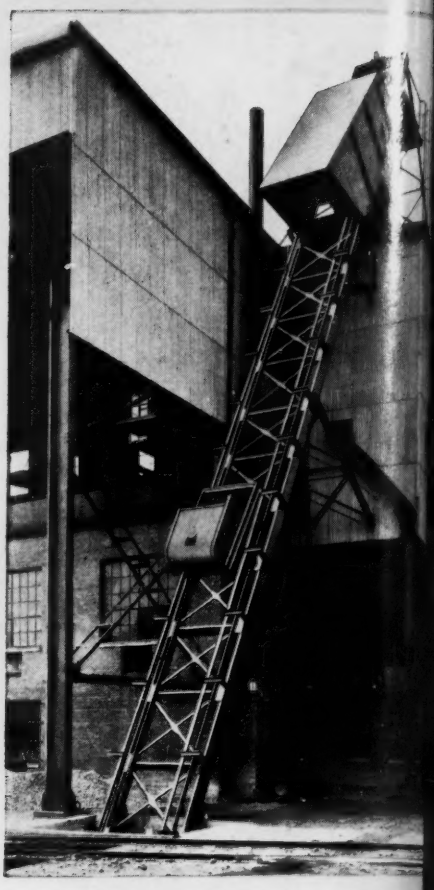
1) Bartlett-Snow Coke and Limestone Skip Hoists like this . . .



2) . . . with the buckets filled automatically from a track hopper with our weigh type loading gate . . .



3) . . . and emptying into an automatic larry car that distributes the materials to the proper overhead storage bins . . .



4) . . . have proven in large, medium and small sized foundries that . . .

coke and limestone handling

Skip Hoists

Minimize breakage of lumps; assure low cost handling; low maintenance and dependable, fully automatic operation

● Why pay a premium for carefully selected, sized coke — and then break substantial amounts of it into breeze before charging it to the cupola? Bartlett-Snow Coke and Limestone Skip Hoists have handled *millions of tons* of these materials. Some installations have been in practically continuous service for twenty-five years. Our engineers will gladly show you what these skip hoists can do. Let us work with you on your requirements.

DESIGNERS

ENGINEERS

BARTLETT-SNOW
CLEVELAND 5, OHIO

FABRICATORS

ERECTORS

Foundrymen Who Know — Buy Bartlett-Snow